SEPTEMBER 16, 1961

Chemical Week

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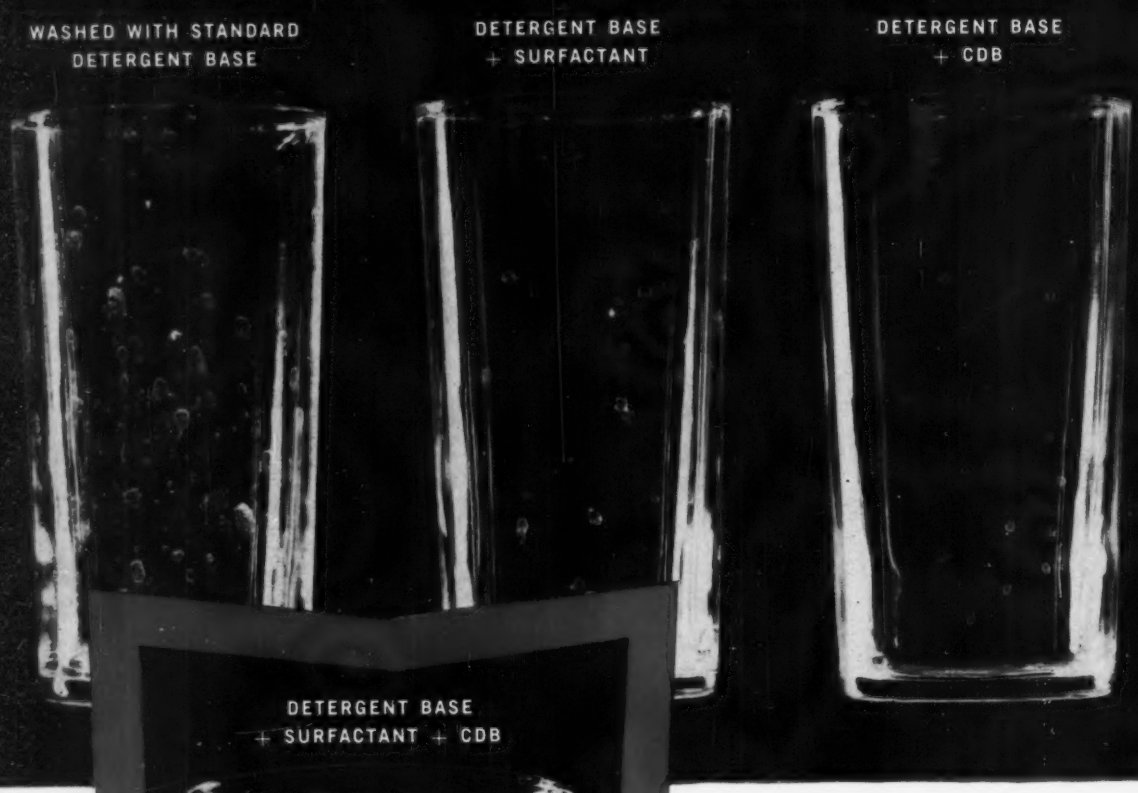

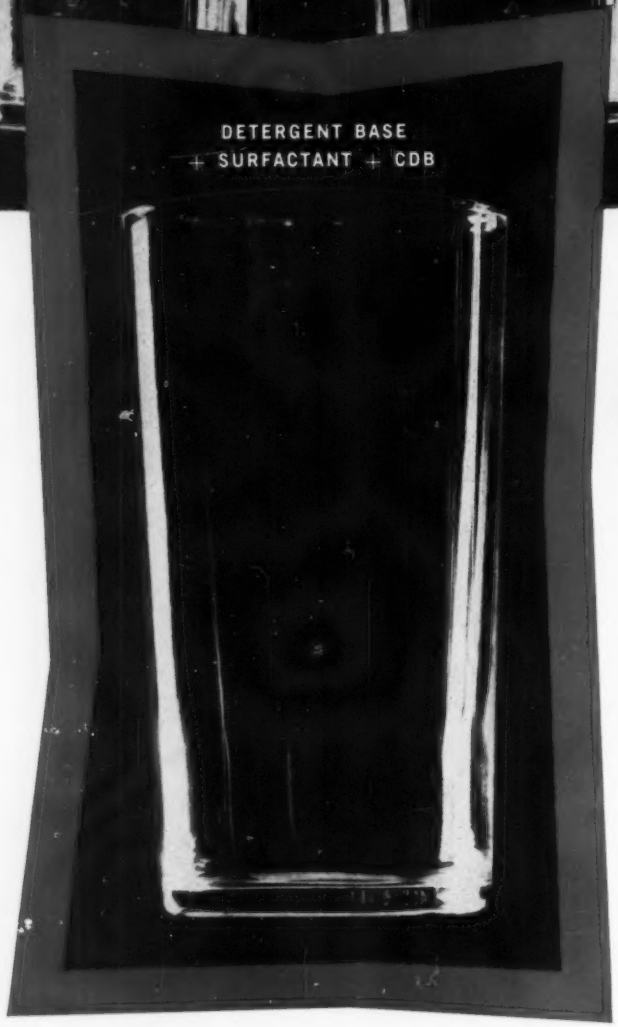

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ON THE COVER: Among the many researchers seeking a payoff in coordination chemistry is American Cyanamid's husband-and-wife team, Marilyn and Joseph Leto (see p. 33).

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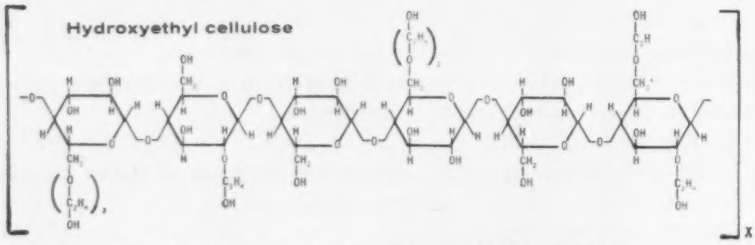
PROGRESS REPORT

—CELLOSIZE HEC
—NIAX Polyethers
—Low-Toxicity Glycol-Ethers

CELLOSIZE HEC effective as surface size for paper

Paperboard mills now have an important time- and money-saving material in CELLOSIZE hydroxyethyl cellulose. When CELLOSIZE HEC is used as a partial replacement for starch, a tank full of surface size *lasts 25 to 50 per cent longer* with at least equivalent sizing performance. Ease of handling and lower cost per pound make CELLOSIZE HEC a clear choice as a cost cutting replacement for anionic materials such as the alginates.



Free-flowing CELLOSIZE HEC, a nonionic synthetic colloid, dissolves in hot or cold water without cooking, and has exceptional tolerance for dissolved salts, papermaker's alum, gums, and adhesives, including borate-stabilized adhesives. Solutions of CELLOSIZE HEC are not tacky and cause no picking on the rolls.

CELLOSIZE HEC films are clear, flexible, and virtually insoluble in the organic solvents used in inks and overcoat varnishes—making CELLOSIZE HEC superior as a gloss and ink holdout surface size for paperboard. These same properties suggest the use of CELLOSIZE HEC as a grease-resistant coating for paper and paperboard.

CELLOSIZE HEC is available in seven uniform grades covering a wide range of viscosities. In addition, any two grades of CELLOSIZE HEC may be mixed to achieve the optimum total solids-viscosity combination for each mill.

The highest viscosity grade of CELLOSIZE HEC consistent with the total solids needed to meet board specifications should be selected for mill evaluation. If the water box, calender stack, or coater is kept at elevated temperatures, a considerably higher viscosity grade may be used than at room temperature. The most viscous grade is recommended for partial replacement of starch.

Full information on CELLOSIZE hydroxyethyl cellulose is available from your CARBIDE Technical Representative, or by checking the coupon.

Four NIAX polyethers that reduce the cost of rigid urethane foams

NIAX Hexol LS-490, Pentol LA-700, Pentol LA-475, and Triol LK-380 are four polyethers that have demonstrated their effectiveness in providing improved formulations through custom control of urethane properties. These materials give rigid foam manufacturers their broadest opportunity to select the right combination of properties for better, lower-cost urethanes.

NIAX Hexol LS-490, a low-viscosity sorbitol adduct, is the newest addition to CARBIDE's already broad line of polyethers. NIAX LS-490 provides easily-handled formulations with excellent dimensional stability, and is high in cross-linking action when used in rigid foams.

NIAX Pentol LA-700 is an effective amine-based polyol, low in molecular weight and penta-functional. This polyether is particularly useful as a cross-linker in rigid and semi-rigid foams, as well as sprayable formulations. NIAX Pentol LA-475 is particularly useful in sprayable rigid foam systems.

NIAX Triol LK-380 gives rigid foams with excellent humid aging properties, high load-bearing and thermal insulation properties and the lowest water-vapor permissibility attainable.

For more information on NIAX polyethers, ask your CARBIDE Technical Representative, or use the coupon below.

Two low-toxicity glycol-ethers

To its family of materials for food-packaging and cosmetic applications, CARBIDE has added two new and interesting propylene oxide-derived glycol-ethers—UCAR Solvents LM and 2LM.

The LM member is the monomethyl ether of propylene glycol and 2LM is the monomethyl ether of dipropylene glycol.

Both of these new materials have combinations of physical, chemical, toxicological, and solubility characteristics that are useful in a variety of applications.

Because of their relatively low toxicity, UCAR Solvents LM and 2LM merit consideration for use as solvents and humectants in food-packaging and cosmetic applications, as well as other skin-contact preparations.

The quality and purity of these new UCAR Solvents meet all contemporary specifications, with the additional advantages of narrower boiling ranges and lower water content.

For more information on UCAR Solvents LM and 2LM—now available in commercial quantities—call your CARBIDE Technical Representative, or check the coupon.

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Your Hidden Resources

CHEMICAL PROCESS INDUSTRIES management has much to be concerned about: spiralling labor costs; overcapacity in many lines; the growing challenge of imports; a diminishing return on increasingly expensive research; and the unabated influx of nonchemical companies into the chemical business. Put all of these factors together and they spell smaller profit margins, even though total dollar sales may be higher than ever.

In this keenly competitive business environment, survival and growth will be a direct function of management's effectiveness in committing its company's resources. Not the least of these resources may be hidden—either for lack of recognition or for lack of proper evaluation. Consider these examples:

(1) New technology lying dormant because of pressure to match what the competition is selling now.

Too often management feels it is safer to make the "popular" product rather than take the risks associated with pioneering a genuinely new product. Such a course may be doubly damaging: the "safe" product often returns a low profit or even no profit; a research department, frustrated in its attempts to promote new technology among its own management, runs a strong risk of losing its most creative people and thereby becoming incapable of doing really worthwhile work.

Although the new product probably would require a comparatively long incubation period before it began paying off, the return would likely be more generous and more lasting. On the second score, demoralization of a research group may take years, so it is no mere cliché to observe that in this sphere management must indeed be far-sighted in encouraging and utilizing new technology.

(2) Large new areas of profit may be veiled by a company's self-imposed restrictions on its role in developing new markets.

Look at plastics. Despite the vast potential for plastics in structural applications, resin makers have been reluctant to concern themselves with building codes, architectural matters, or labor practices in the building industry. Yet plastics producers are openly disappointed over the slow headway they are making in the construction field. Justified as this feeling may be, it will not sway legislators, architects, contractors, or trade union leaders.

If the technology is sound and the potential rewards are large, it behooves chemical companies to come to grips with the problems of opening new markets. The rewards will not be collected by those who take refuge in the assertion that "our business is making chemicals, not building houses or lobbying for new construction codes."

A good parallel may be found in the retailing industry. Many supermarket chains are allotting a sizable portion of their valuable display space to nonfood items, such as haberdashery and phonograph records. Behind this strategy are the higher profit margins offered by these products, and the demonstrated fact that shoppers appreciate the convenience of purchasing such items in a supermarket. Some chains conceivably may resist this trend on the principle that "we are in the food business, not the clothing or music business," and it is quite conceivable that they will go bankrupt defending this principle.

(3) Resources devoted to optimizing sub-operations when they could be used instead for integrated corporate planning for maximum profitability.

Effective use of operations research is being made by individual plants

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Protective Lining Corporation offers VISOTHERM-A polyethylene film liners with or without "Fill-n-Flo" spout. Liner bottoms snugly fit the carton on all sides, corners and bottom, and round-bottom liners are available for drums, pails and cans. VISOTHERM-A film accepts greases, oils, aromatics, hot or cold liquids and granulated products with equal dependability.

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and divisions within a host of chemical process companies. But few companies are prepared to subject over-all management decisions to the kind of mathematically oriented analysis that is proving so fruitful on a departmental level.

To be sure, management's decision-making role will not be taken over by computers. But relatively inefficient trial-and-error management must inevitably be replaced by more sophisticated, scientific techniques that permit swifter and better decision-making at top levels.

In a business community as large and as variegated as the chemical process industries each company, of course, has its special problems and its special resources to meet those problems. Those managements that take the trouble to seek out and exploit their hidden resources—which surely exist—will be rewarded in the currency of corporate growth and profitability—at the expense of their more complacent competitors.

Water: CPI Challenge

ONE OF THE MOST controversial, important, and utterly fascinating chapters of U.S. technologic history will unfold during the next half century. It concerns the unbelievably complex problem of learning how to handle the nation's water supplies wisely enough to avert a major economic and sociologic crisis.

The U.S. has plenty of water—but the country doesn't yet know how to conserve, distribute, and use it to best economic advantage—or even how to keep it clean.

The U.S. chemical industry is, we are certain, destined to play a top role in solving this problem. The industry's growth is dependent on availability of adequate water. It must achieve this growth, moreover, without complicating waste disposal and water-pollution problems.

The chemical industry is now often selected as a prime culprit in creation of many water problems. But it has the opportunity to distinguish itself as the leader in overcoming this problem—perhaps the top sociotechnologic challenge the nation will face in the next half century.

For example, who but the chemical industry has the technical knowledge to solve pollution problems that result from municipal, industrial and agricultural discharge of thousands of different chemical compounds? If the chemical process industries do not do it—the job may never get done, at least well enough to properly safeguard life and property.

But if these problems are to be licked in time (the nation is already neck-deep in water crises in many areas) a wholly new attitude toward water conservation and pollution control must be adopted.

The chemical industry has a giant opportunity to set itself up as unchallenged leader in this technologic adventure. But if it denies its responsibilities, and ends up being forced into the fray by governmental pressure, it will deserve no position of command, win few followers.

The future well-being of the CPI as well as that of the nation is tied to the meeting of the water challenge quickly and effectively. It will be a highly controversial arena—and certainly not a place for the faint-of-heart. But the CPI, accustomed to struggle, has long since demonstrated its ability to cope with knotty problems.

To stimulate CPI thinking on the subject, *CW* will Sept. 30 publish a special report on water—covering problems of resources, saline conversion, and pollution. We won't have all the answers—no one does. But *CW* does hope that its months-in-preparation study of water problems will stimulate the CPI to a spirited and sincere effort to meet the great challenge of water.

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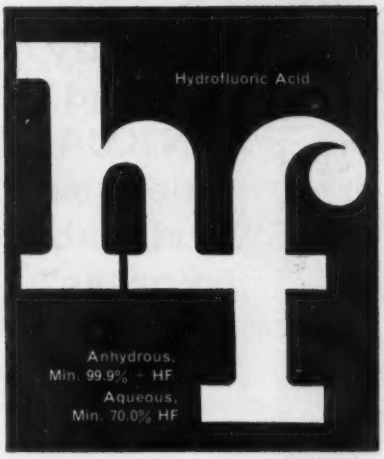

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Available in tank cars, tank trucks and returnable all-steel or polyethylene-lined steel drums.

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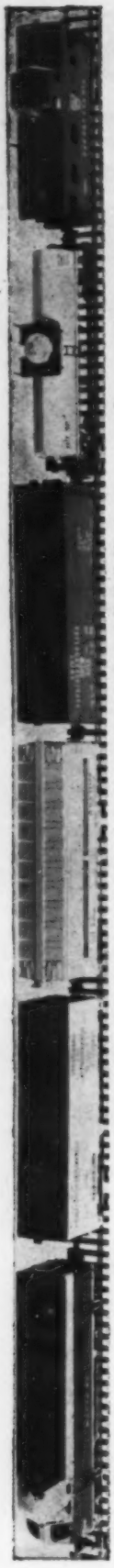

urgently needed TANKCAR rides the "Perishable Express"

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General Mills Chemical Division is an established supplier to the fast moving chemical process industries. We know first hand the bottlenecks that develop when production schedules are missed. That's why we're always ready to make that extra effort. Why don't you investigate General Mills Chemical Division as a source of supply. . . . and of service.

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LETTERS

No Agreement

To THE EDITOR: We think it would be helpful if we outlined the problem about using the name of Esso Standard Eastern and/or Mobil Petroleum in news stories prior to the actual dissolution of Standard-Vacuum Oil Co. (*CW, Aug. 12, p. 18*).

The discussions with the government of India on the proposed petrochemical plant at Trombay are being carried on by Standard-Vacuum and not by Esso.

Agreement between our two parent firms, Standard Oil Co. (New Jersey) and Socony Mobil Oil Co. to divide Standard-Vacuum's assets will not actually be implemented until a "closing date." It is expected that this will not come until sometime early next year. Until that time, Standard-Vacuum continues to operate its own properties and to conduct negotiations with governments in the various countries where we operate.

It is therefore misleading and inaccurate to use Esso Standard Eastern or Mobil Petroleum in connection with Standard-Vacuum's operations at the present time.

With specific reference to the petrochemical project in India, the . . . article is misleading in that it implies that agreement has been reached. This is definitely not so . . . and no license has been issued for this project.

DAVID F. DAVIS
Manager
Public Relations Dept.
Standard-Vacuum Oil Co.
White Plains, N. Y.

Civilized, Peaceful South

To THE EDITOR: I have always considered myself a segregationist, being a director of my local White Citizens' Council, but now I'm convinced I'm a wet-eared kid in this field and bow to my Northern neighbors. According to my observations on a recent trip to the "deep integrated North" (Michigan), they really know how to browbeat and make fourth- and fifth-class citizens out of the colored people. . . .

To comment on M. Frank Levy's letter (*July 22, p. 7*): Industry is interested in the South, as well as the South's being interested in industry. The South has natural resources that industry can use locally without transportation charges. It is an established fact that labor is more compatible with management in the South. . . .

Industry is certainly as welcome here as in the North. You can rest assured that the South is civilized and peaceful, our only disturbances being agitators from outside. . . .

JAMES K. FLETCHER
Farmerville, La.

MEETINGS

International Superphosphate Manufacturers' Assn., technical conference, Wiesbaden, Germany, Sept. '61.

Canadian Agricultural Chemicals Assn., ninth annual meeting and conference, Mont Tremblant Lodge, Mont Tremblant, Que., Sept. 18-20.

Technical Assn. of the Pulp and Paper Industry, fourth international mechanical pulping conference, Edgewater Beach Hotel, Chicago, Sept. 19-21.

National Petroleum Refiners Assn., Rocky Mountain regional meeting, Henning Hotel, Casper, Wyo., Sept. 20-21.

Joint Industrial Electronics Symposium, Bradford Hotel, Boston, Sept. 20-21.

National Industrial Conference Board, ninth annual marketing conference, Waldorf-Astoria, New York City, Sept. 20-22.

National Assn. of Corrosion Engineers, ninth biannual corrosion tour, Lincoln Hotel, Odessa, Tex., Sept. 20-22.

Air Pollution Control Assn., 1961 annual meeting, East Central section, Sheraton-Seelbach Hotel, Louisville, Ky., Sept. 21-22.

University of Denver Research Institute, second rare-earth conference, Colorado Hotel, Glenwood Springs, Colo., Sept. 24-27.

American Society of Mechanical Engineers, ASME petroleum mechanical engineering conference, Muehlebach Hotel, Kansas City, Mo., Sept. 24-27.

American Society of Mechanical Engineers, national power conference (ASME-AIEE), St. Francis Hotel, San Francisco, Sept. 24-27.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

The first glass-smooth, stretchable, moisture-resistant release paper

New "Stretchable" Stick-Not has the strength and resilience of extensible Kraft paper.

It has the excellent moisture barrier characteristics of polyethylene.

It has the uniform, controlled-release of all Crocker, Burbank silicone release papers.

Crocker, Burbank's new "Stretchable" STICK-NOT is a release paper with a unique set of properties, and a thousand applications.

Because it stretches, it can be used as a release paper in tight rolls such as rubber sheeting or flooring mats — without rupturing or puckering.

Because it's a moisture-vapor barrier, it can be used outdoors or in wet, steamy atmospheres. Or with moist compounds or frozen foods.

Because it has remarkable tear-strength, it offers important advantages to makers of floor tiles, plastic foams, sticky compounds, drum and carton liners, to mention only a few.

Stretchable Stick-Not's glass-smooth surface allows 100% adhesive contact. A stable release even after extensive aging, it may be obtained in a wide range of releases from "tight" to "free." It is now available in rolls.

Other STICK-NOT Release Papers

For release from pressure sensitive adhesives

Carrier and interleaf for rubber and other sticky products

Casting paper for plastic foams

Release from pressure sensitive coated films, laminates, labels, floor tiles, wall coverings, shelf linings and shingles.

Send for Samples

CROCKER, BURBANK PAPERS, Inc.
Fitchburg, Massachusetts

Please send samples and information on new "Stretchable" Stick-Not release paper. I am interested in the following applications.

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ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

WHY THE BIG STRAIN?

It's tough to keep gases and liquids "clean" as they run through a pipe. They drag impurities along, which can make even plain water a trouble maker, let alone more sophisticated fluids. That's because water, as a liquid or steam, is intimately involved with vital equipment like steam traps, temperature regulators, or tools. Meters, burners, nozzles, and pumps, too.

By this time you must realize we're going to talk strainers, don't you? A good, stout subject, of interest to all who feel production belongs up and costs belong down. Sarco makes strainers for water and condensate, steam, oil, air, gas and other piped fluids . . . dozens of different sizes and types and ratings of strainers to match every application need. Even our line of plain and simple strainers is built for super service. These are pipeline strainers, types AT, BT, and CT, which are designed for 250, 250 and 600 psi non shock, respectively, and 475°, 450° and 750°F. temperature ratings. Standard screens are heavy-gauge, perforated brass or stainless steel. Sarco specializes in screens that can withstand abnormal pressure differentials created by accumulated sediment.

Next, Sarco's flanged strainers, type D. These come in larger sizes, right up to 12", and are available in standard or extra heavy types.

And finally, *Sarco scraper strainers*, manual or motorized. These are the really eye-popping models, and if you can't use one yourself — well — you'll just have to get your kicks elsewhere.

Examples? Take Inland Steel Company at East Chicago, which gets water from Lake Michigan to cool its large air conditioner condensers. The water used to pass through traveling screens, but still contained fine sand. Clogging!

Heat under collars! Frequent cleaning required! Sometimes practically no air conditioning on hot days. (Isn't that always the way?)

The Inland Steel people installed Sarco Rotary Scraper Strainers, Type VRS, which incorporate a hand-operated helical scraper knife within the cylindrical strainer screen. A few turns of the crank at regular intervals, and the sand is scraped off the screen, blown clear, and discharged at pressure through a manual valve to waste. Dismantle the strainer? Shut down the unit? Not *this* strainer!

Now, as long as we've come this far, it's only a hop and a skip to the Firestone Tire and Rubber Co. in Akron, Ohio, who also use water in tremendous quantities. They circulate it through tire presses and a cooling tower, and there's no nonsense about it. It *has* to be clean or damage to equipment could be downright catastrophic. When the plant

modernized and enlarged, Firestone replaced their 4" Sarco hand-operated scraper strainer, type VRS, with a larger Sarco 8" model. And while they were about it, they got the motor-operated type, for continuous cleaning.

When we say that companies like these want the insurance of a Sarco strainer, it sounds like advertisingese, but sometimes there just isn't any other way to put it. Sarco strainers *are* insurance at low cost on the operation of your high cost equipment. So when we ask if you have lumps in your pumps, or worries over your slurries, we're *serious*. We've heard everything in the straining line, so why not write us for literature and answers to those special problems you have.

A T-44 IS THE BEST POLICY

Sorry, but we can't leave the subject of insurance without bringing to your attention one of the best little insurance policies any company requiring cooling control could invest in. It's the *self-powered* Sarco T-44 Automatic Cooling Control. No compressed air or electricity is needed, but its advantages are best described in terms of three different plants of just one Sarco customer — Revere Copper and Brass, Inc.

Revere-Baltimore, Md., has cut water use 40 to 50% with T-44's. But in addition to former water waste, Revere had even more problems: possible wet air from uncontrolled cooling of compressor aftercoolers, plus sweating compressor cylinders; variations in viscosity of hydraulic oil and bearing oil; gas generator water waste; unreliability of manual shut-off of water supply when machines were down.

If your ears perk up in sympathy at mention of any of these problems, the results of Revere's cooling control program should bring you to full attention. One large compressor that had gulped 2400 gallons per hour now takes only 420 gallon sips. In addition all the problems itemized above were solved. T-44's are now used on their air compressors, gas generators, and hydraulic oil systems. At Revere-Riverside, Cal., water savings of 50% were experienced, and at Revere-Rome, N. Y., substantial savings were made too.

But after all, wasting water is only one way of wasting money, so let's go on to another matter of interest: the evils of manual control. When cooling water is controlled by hand the temptation to leave the valve nearly wide open is almost overpowering, in order to play it safe if the load varies. Result: overcooling, of course. And varying the flow runs the risk of undercooling. In either case, lowered process efficiency. Answer: The automatic Sarco T-44, which can't be tempted, is meticulously honest, unsentimental, and plain inhumanly practical when it comes to cooling control. You really ought to write for literature. T-44 is your best policy.

SPARE PARTS INSURANCE

As long as we're near the end, and still on this subject of insurance, may we graciously leave you with this valuable tip? No matter how closely a steam trap approaches perfection, some gremlin may cause it to act up. It's conceivable. So, keep on hand a parts list and spares of key parts for your steam traps and other system components. Parts are small and worth their weight in gold when you need them. A Sarco field engineer will make up a suggested list for you, if you tell us what components make up your system.

Might as well even keep a disc or two on hand for your Sarco Thermo-Dynamic Steam Traps, Type TD-50, even though they're so trouble-free our salesmen keep complaining about the lack of replacement parts business. We'll be glad to tell you about this unique steam trap in case you still don't know how miraculously simple and effective it is.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both — to the point where you'll communicate.

5903

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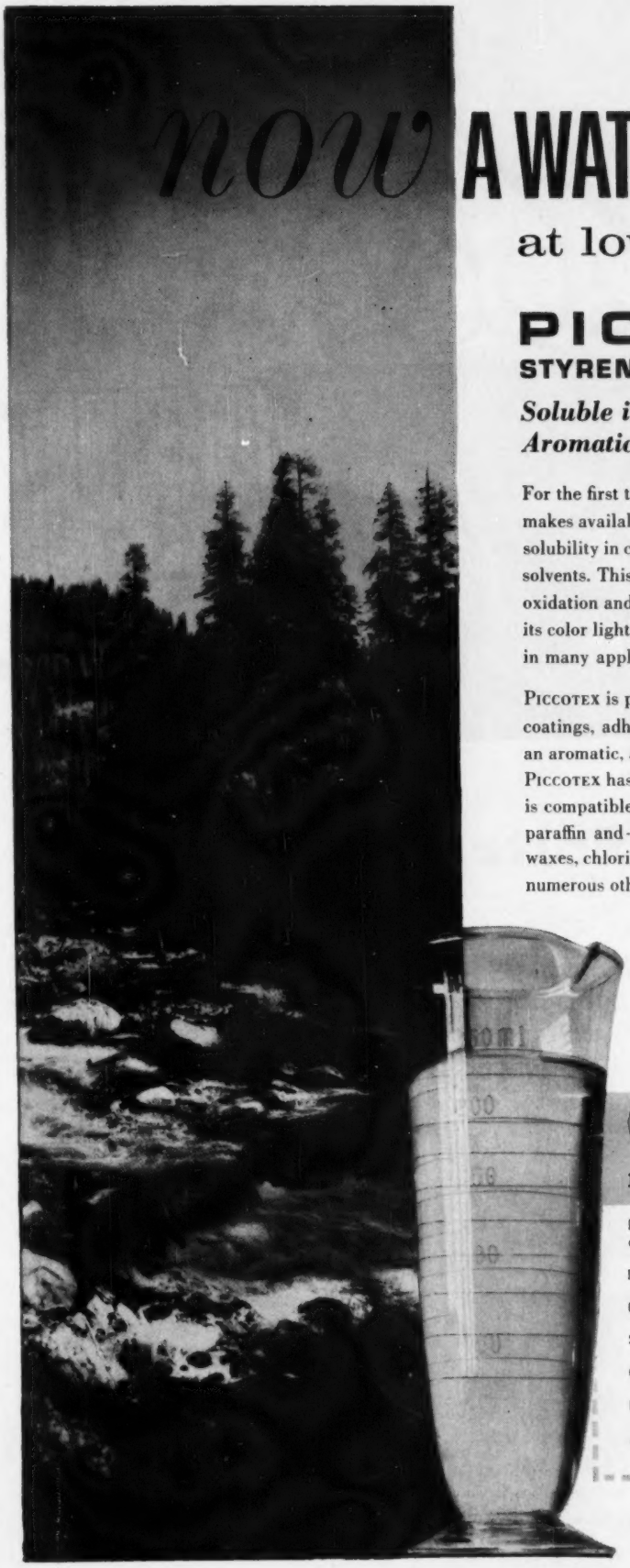
STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES



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For the first time in chemical history, the creation of PICCOTEX makes available a hard, styrene-derived resin with **revolutionary** solubility in chlorinated, aromatic, and entirely aliphatic solvents. This new product exhibits excellent resistance to heat, oxidation and ultra-violet exposure. Its cost is low enough and its color light enough to make pigment saving an important factor in many applications.

PICCOTEX is pouring into hundreds of applications in the paint, coatings, adhesives, textile and rubber industries—wherever an aromatic, alkali-and-acid resistant, colorless polymer is desirable. PICCOTEX has iodine and saponification values of zero. PICCOTEX is compatible with polystyrene, rubber, commonly used plasticizers, paraffin and—at selected concentrations—microcrystalline waxes, chlorinated waxes, terpene resins, rosin derivatives and numerous other compounds.

PICCOTEX is available in solid form in 100°C and 120°C melt-point grades, or in mineral spirit solutions.
For whiter whites and brighter colors with less pigment, specify low cost PICCOTEX.
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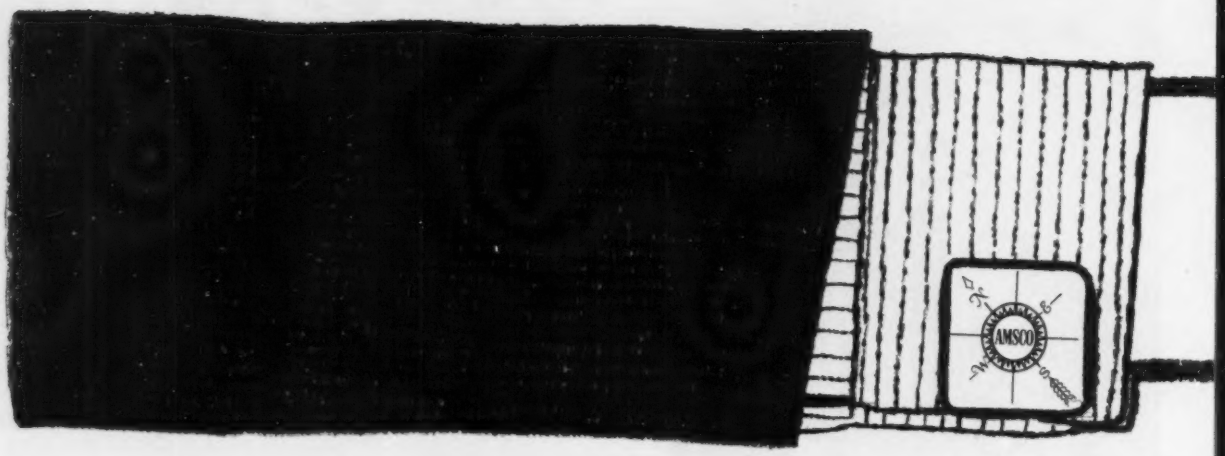
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The stickier the better, we say, because our long experience in solvents qualifies us to help adhesive manufacturers formulate and solve adhesive problems. No source offers you better quality, service or convenience. Our complete inventory is as near as your telephone. With AMSCO, one call does it.

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NOPCO MAKES WATER MORE PENETRATING

Add some of Nopco's surfactants to rainwater and it would quickly find a way through an umbrella. But that would be only a parlor trick. In industry, water so treated has certain crucial advantages. It helps dyes penetrate more deeply into fabrics. It makes oils penetrate and soften leather. It has the peculiar property of near-miscibility with oils and greases—behavior that is the basis for the multimillion-dollar cleaning industry.

When your processing problems can be traced to too high a surface tension, look to Nopco for the proven surface tension depressant to solve them.

For further details, see Nopco's section in Chemical Materials Catalog, pages 212-213

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Controlled Dispersion for effective process control

If you mix dry solids, how long has it been since you gave serious thought to the *action* employed by your mixer?

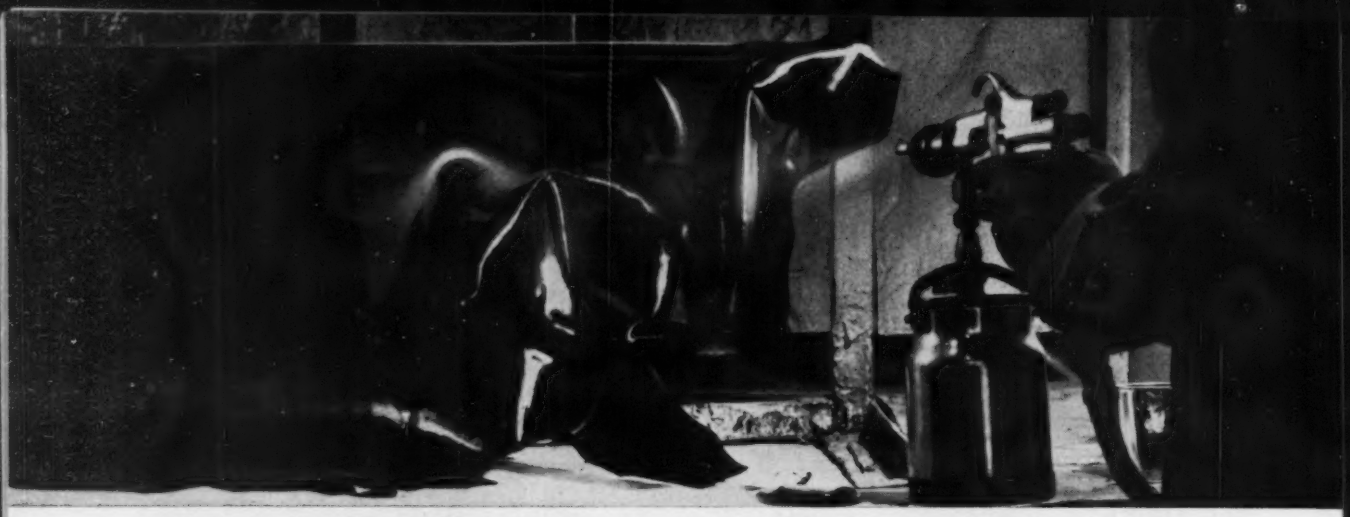
If you're mixing dissimilar and/or disproportionate materials; coating a fine dry material; blending liquids into powder or dispersing a small amount of liquid or binder—you need *more* than a simple stirring, tumbling or agitator action can *give.*

Look at it this way . . . today's raw materials are more uniform, of higher purity and they *cost* more. Quality control standards are stringent. It's easy to get caught in the bind between soaring materials costs, tougher control standards and high *waste.* Oddly enough, processors who spare no expense in otherwise equipping a process with the most modern time-saving components often overlook a principal source of waste . . . *outdated mixing practices.*

We would like to demonstrate how you can save valuable raw materials and in many cases eliminate secondary processing by making the most of mixing properties—with a Simpson Mix-Muller. Write for details on a confidential, laboratory conducted mulling survey and for our Handbook on Mulling.

P-3618

SIMPSON MIX-MULLER DIVISION
NATIONAL ENGINEERING COMPANY
642 Machinery Hall Bldg., Chicago 6, Illinois



Growing use for urethane coatings: making economical patent leather coatings. Shell's versatile Pent-Oxone high boiling solvent works well in urethane and most other coatings, eliminates need for premium-priced specialty solvents.

URETHANE FORMULATORS:

Shell's multi-purpose Pent-Oxone* solvent gives you the advantages of a specialty high boiler for urethane coatings—yet lets you reduce solvent inventory

Shell's Pent-Oxone solvent is excellent for two-package urethane coating systems. You can also use it to good effect in almost every other type of surface coating you make.

Result: reduced inventories for the specialty coating formulator who doesn't want to stock premium-priced specialty solvents.

SHELL CHEMICAL's Pent-Oxone solvent combines both ketone and ether functional groups in a unique new keto-ether molecule.

As you might expect, this remarkable structure makes Pent-Oxone an outstanding and versatile solvent.

Good urethane solvent

Pent-Oxone solvent is a true high boiler, with an even evaporation rate midway between the evaporation rates of cyclohexanone and EGMEE acetate.

In urethane coating systems, Pent-Oxone solvent combines strong and effective solvency with low isocyanate reactivity. Pent-Oxone has no labile hydrogen and never needs to be upgraded for purity.

Viscosities of typical urethane coatings, using 40 parts solids in 100 parts of 50/50 Pent-Oxone/xylene, range between 11.5 and 53.0 cps. after one-day storage.

Isocyanate percentages remaining after eight-week storage of Pent-Oxone solvent and toluene di-isocyanate (25 per cent in toluene) are on the order of 96.2 per cent.

Lets you reduce inventory

Pent-Oxone solvent is extremely versatile. By using it in other coating formulations, you can reduce high boiler inventory.

In acrylic lacquers, Shell's Pent-Oxone solvent will give you outstanding gloss and excellent flow. Its solvency is in all respects equal to that of EGMEE acetate.

In vinyl lacquers, Pent-Oxone can lower your high boiler costs and give you a better-smelling product.

In nitrocellulose lacquers, Pent-Oxone solvent provides low viscosity, good flow-out and excellent blush resistance. Its dilution ratio is comparable to that of low boilers.

You will also find Pent-Oxone solvent an excellent high boiler for cellulose acetate butyrate lacquers, for alkyd and epoxy enamels and for thermosetting acrylic coatings.

New technical bulletins

New technical bulletins are either available or being prepared on all these applications, as well as on the general properties of Pent-Oxone solvent and its near relation, Pent-Oxol* glycol ether solvent.

To get copies, plus samples, contact any of Shell's 9 Industrial Chemical offices, or write directly to Shell Chemical Co., 110 W. 51st St., New York 20, New York.

*Trademark, Shell Chemical Co.

Shell Chemical Company

SHELL

Industrial Chemicals Division

Business
Newsletter

CHEMICAL WEEK
September 16, 1961

Projections of economic activity are being revised upward again. The nation's output of goods and services (gross national product) may climb to an annual rate of $570 billion by second-quarter '62, says Walter Heller, chairman of the President's Council of Economic Advisors. (The rate was $516 billion in the second quarter of this year.)

In June, Treasury Secretary Douglas Dillon predicted the gross national product would reach an annual rate of about $530 billion by the end of '61, climb to $540 billion in first-quarter '62, and wind up next year at the $570-billion rate.

In the Administration's latest revision, Heller pushes the first-quarter '62 prediction to a rate of "something like $550-555 billion, and in the second quarter perhaps $565-570 billion." He also indicates that a $600-billion/year rate may be achieved in early '63.

Reasons for the brighter outlook stem from the faster-than-expected recovery from the recent recession and from the government's increased military spending because of the Berlin crisis.

•

France's first *cis*-polybutadiene plant is being blueprinted by Société des Elastomeres de Synthese, a French-American company that groups Saint-Gobain, Shell, Texas Butadiene and French tire producers. The plant will have capacity of 20,000 metric tons/year, will probably be in operation by the end of '63.

Decision to build the unit came as the result of recent general agreements between Shell and Goodrich-Gulf and between Shell and Montecatini to pool their *cis*-polybutadiene patents. Société des Elastomeres will have exclusive license to these patents in the first few years of its *cis* production, as well as the right to use Ziegler-developed organometallic catalysts.

•

Big nylon expansion for Argentina. Ducilo S.A.I.C., an Argentine affiliate of Du Pont, will double production of nylon textile yarn, and build the South American country's first commercial-scale nylon tire yarn plant at its Berazatequi spread near Buenos Aires. Construction work on both projects will start immediately, and the units are expected to be in operation next year.

Argentine tire makers currently use locally produced cotton and rayon, imported rayon tire fabric, and small amounts of imported nylon tire fabric. Ducilo will continue to manufacture rayon tire yarn, but the new nylon operations anticipate rapidly increasing tire demands.

•

Freeport Sulphur may go into the uranium business. Since Freeport sold its Lake Washington, La., oil and gas interest in '58, the com-

pany has been looking for promising investment opportunities. Reportedly of current interest: Uranium Reduction Co. (Salt Lake City), which has an $8.6-million plant near Moab, Utah; three groups of mining claims in that state; and a contract to sell about 12 million lbs. of uranium oxide to AEC between now and Dec. 31, '66.

•

The chemical process industries are raising their sights on capital plant and equipment spending for the rest of the year.

The latest SEC-Commerce Dept. survey shows that the CPI lowered their spending plans between February and April of this year—but then boosted them by late July and August, when the latest survey was taken. As things stand now, spending plans for the fourth quarter are $1.74 billion, compared with $1.56 billion in the third quarter; and the year's total now is put at $6.12 billion, compared with $6.34 billion estimated in February and $6.07 billion in April.

Chemical and allied products firms' spending at $1.65 billion is close to the '57 record; petroleum companies' anticipated spending of $2.8 billion is the highest since '57. Government officials find no sign of changed plans resulting from the President's July 25 Berlin mobilization speech. Whatever the impact of Berlin may be, they expect it to show next year after boards of directors meet this fall. For industry in general, the existence of considerable unused capacity probably weighs against a general expansion of investment at this time.

CPI's Capital Spending Plans

(Actual and estimated expenditures for new plant and equipment in billions of dollars. Sources: U.S. Dept. of Commerce, Securities and Exchange Commission.)

	'60 Actual	*'61 est. in July-Aug.*	*2nd Qtr. Actual*	*3rd Qtr. est.*	*4th Qtr. est.*
Chemicals and allied products	1.60	1.65	0.42	0.42	0.47
Products of petroleum and coal	2.64	2.78	0.70	0.70	0.82
Rubber products	0.23	0.22	0.05	0.06	0.06
Pulp, paper and allied products	0.75	0.72	0.17	0.19	0.19
Primary nonferrous metals	0.31	0.26	0.07	0.07	0.06
Products of stone glass and clay	0.62	0.49	0.12	0.12	0.14
TOTALS	**6.15**	**6.12**	**1.53**	**1.56**	**1.74**
All manufacturing	14.48	13.80	3.46	3.44	3.90

What's News in Rubber...

Faster-curing new Butyl cushions playground tumbles

New Enjay Butyl HT 10-66 gave Mitchell Rubber Products, Inc. of Los Angeles, California, a big jump ahead in its "Safety-Surf" playground mat (shown above). Mitchell has combined this new Butyl rubber with their engineering "know-how" for an abrasion, weather and shock resistant mat that makes playgrounds safer for children.

New Enjay Butyl HT 10-66 is an isobutylene-isoprene copolymer containing chlorine. It can be cross-linked by a variety of vulcanizing techniques, using either the carbon-to-carbon double bonds, the allylic chloride, or both. Vulcanization is usually more rapid than with unhalogenated Butyl, but vulcanizates show the same inertness to environmental attack. More stable cures make Butyl HT 10-66 outstanding for high-temperature uses.

Butyl HT 10-66 is now in full-scale commercial production, proving its worth in many demanding uses. For test samples and performance data, write to Enjay, 15 West 51st Street, New York 19, N. Y.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

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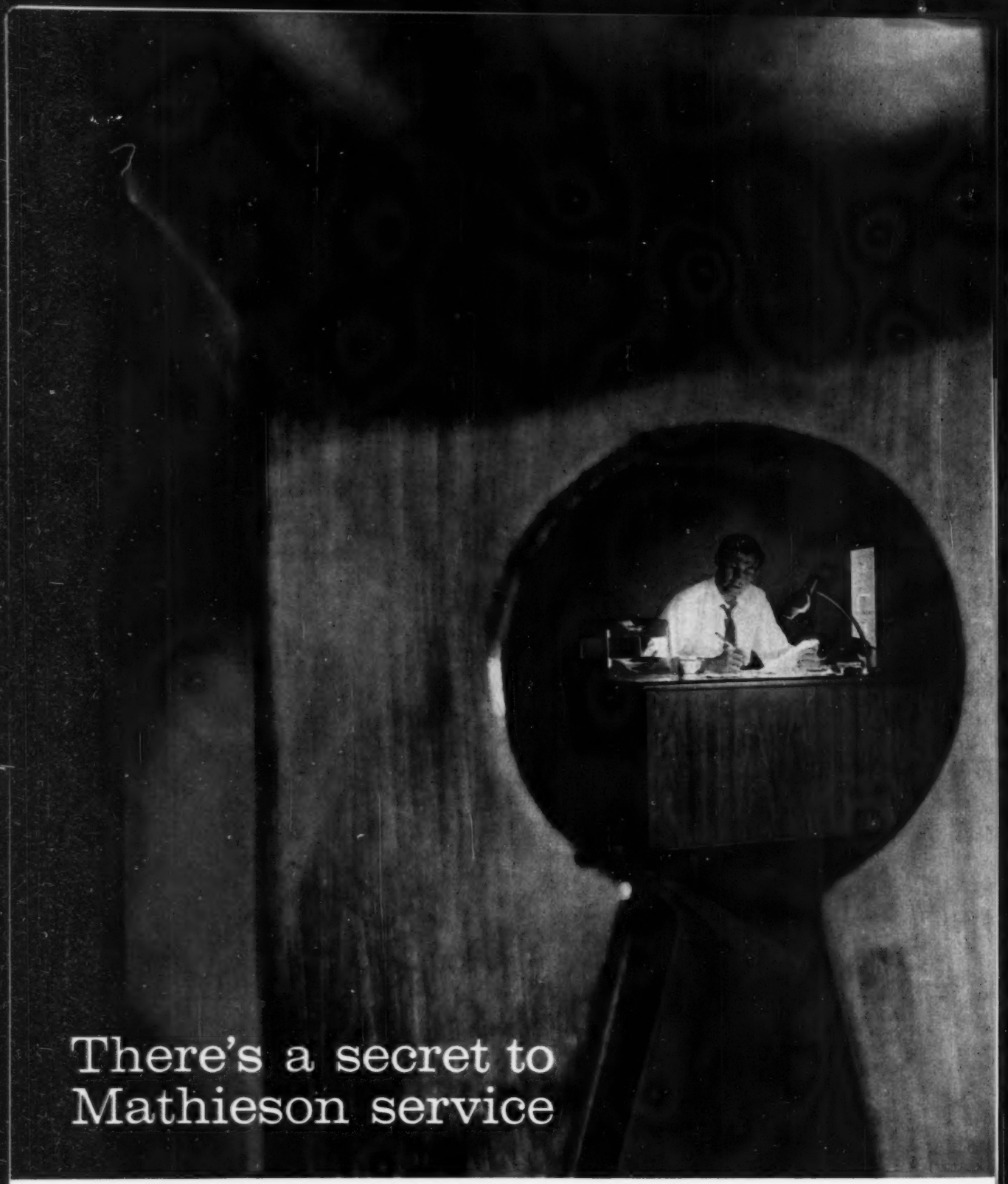

There's a secret to Mathieson service

The secret, of course, is hard work, putting plenty of time and thought against your problems. Scheduling deliveries, for example. Or checking freight rates, writing field reports, studying your operation, calculating your final in-plant cost of chemicals, establishing flow charts. In total, keeping tabs on the flood of details that wrap up a job properly.

This kind of service pays off for you . . . gets chemicals into your process efficiently and economically. We will be glad to talk about specifics. Call OLIN MATHIESON, Baltimore or Joliet.

MATHIESON CHEMICALS, Baltimore, Md.—Ammonia • Carbon Dioxide • Caustic Soda • Chlorine • Hydrazine and Derivatives • Hypochlorite Products • Methanol • Muriatic Acid • Nitric Acid • Soda Ash • Sodium Bicarbonate • Sodium Chlorate • Sodium Chlorite Products • Sodium Methylate • Sodium Nitrate • Sulfur (Processed) • Sulfuric Acid • Urea • **BLOCKSON CHEMICALS, Joliet, Ill.**—Trisodium Phosphate • Trisodium Phosphate Chlorinated • Sodium Tripolyphosphate • Tetrasodium Pyrophosphate • Polyphos (Sodium Hexametaphosphate) • Monosodium Phosphate • Disodium Phosphate • Sodium Acid Pyrophosphate • Tetrapotassium Pyrophosphate • Sulfuric Acid • Hydrofluoric Acid • Phosphoric Acid • Sodium Silicofluoride • Sodium Fluoride • Teox® 120 Surfactant. **MATHIESON and BLOCKSON are Olin Chemicals Division brands.** 242

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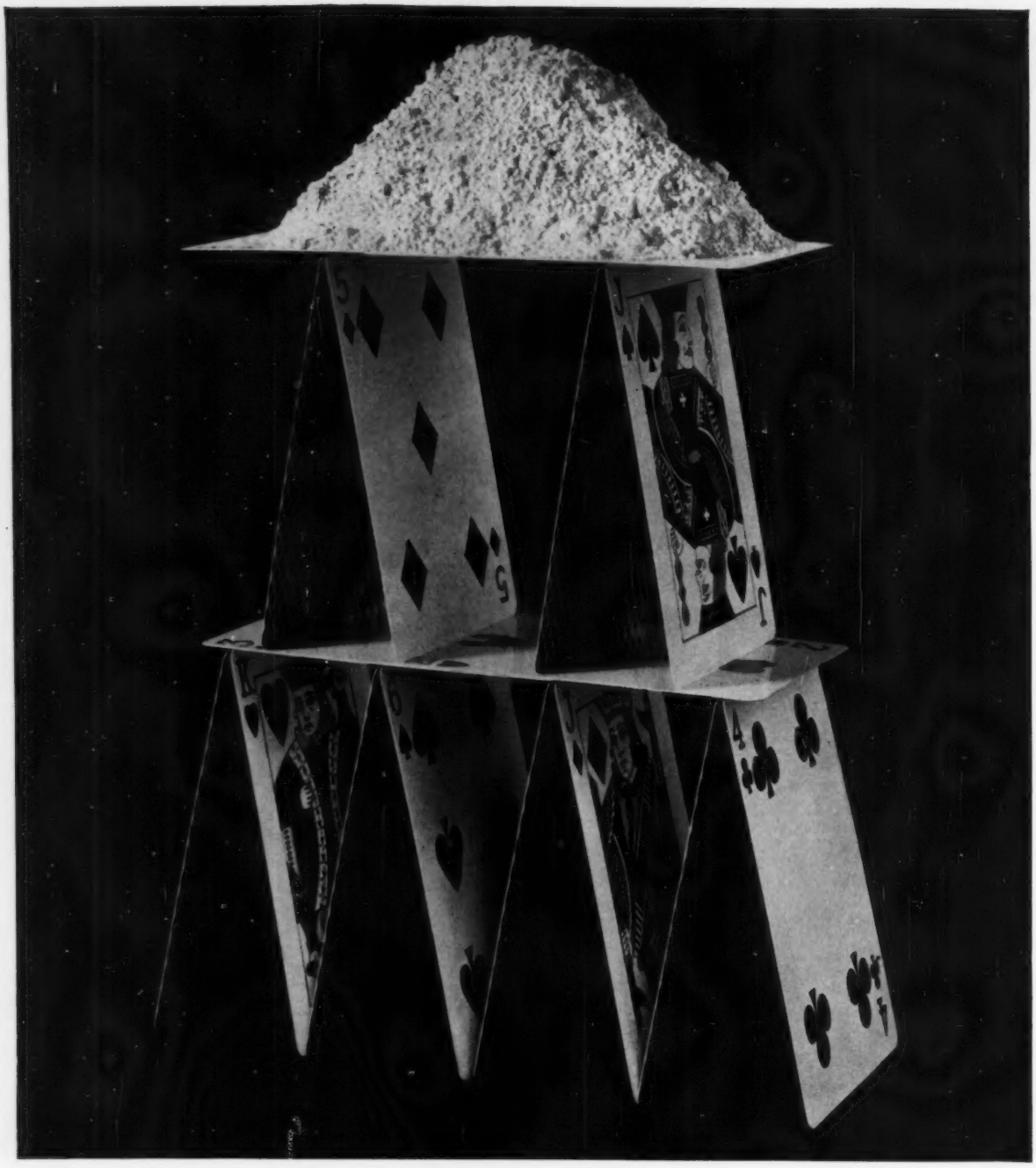


Get low-cost bulk with lightweight Celite Fillers

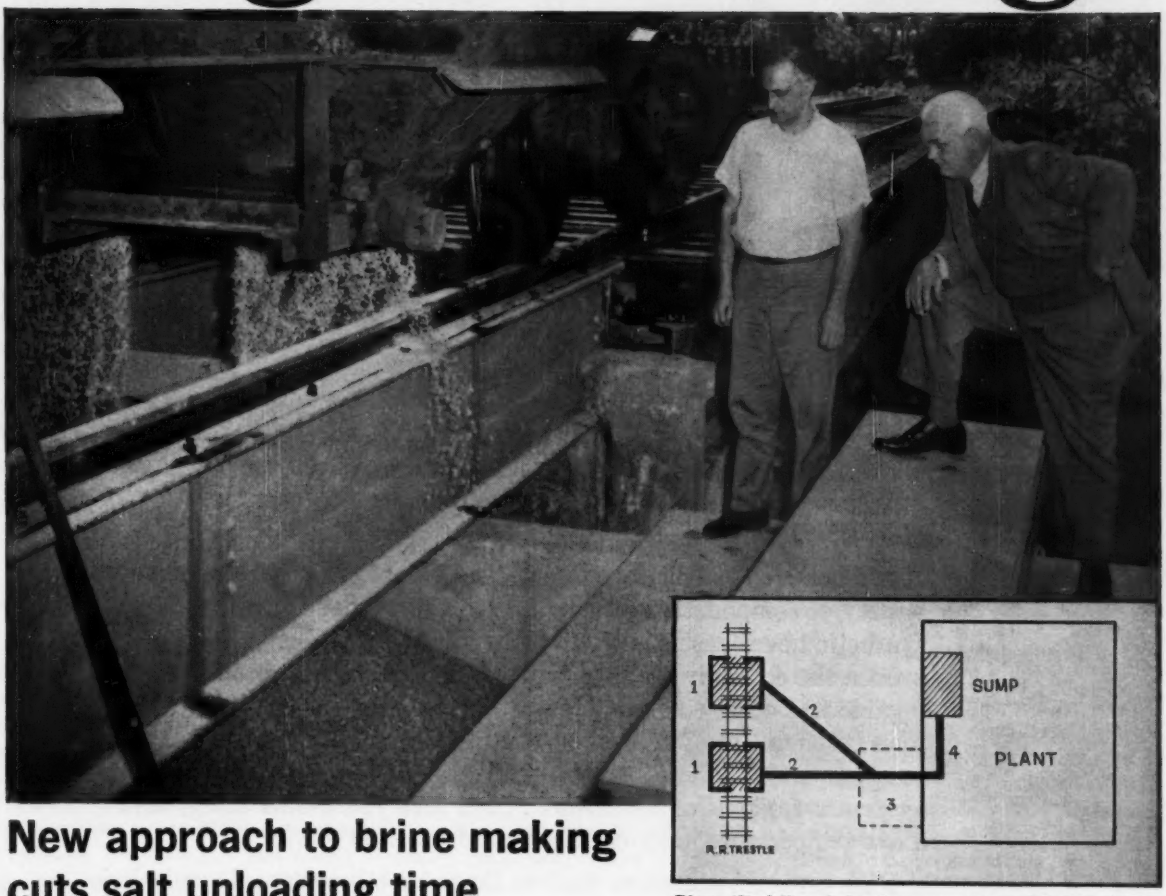
If your formulation requires a high-bulking filler that is chemically inert, Celite® diatomite is the cost-cutting answer. Because Celite particles contain up to 93% air space, as little as 7 pounds will bulk to a full cubic foot. Depending on grade, Celite has up to 3 to 6 times higher bulk, 2 to 3 times better absorption, and superior chemical inertness, as compared to kaolin and attapulgite-type clays.

Celite is also valuable where high absorption is necessary. It can absorb up to double its weight of liquid. Processed from the world's largest and purest diatomite source, Celite has the highest degree of uniformity in the industry. What's more, you can choose from the widest selection of standard and special grades.

For full details, write Johns-Manville, Box 325, New York 16, N. Y. In Canada: Port Credit, Ont. Cable address: Johnmanvil.

JOHNS-MANVILLE

salt engineering



Pipes (2) deliver brine from new 55-ton Lixators (1) to existing pipe line (4) that served old Lixator (3). New construction made maximum use of existing installation—did not affect railroad trestle or plant interior.

New approach to brine making cuts salt unloading time 32 man-hours per car

At this N. J. plant Sterling Rock Salt used to be unloaded manually into a chute feeding a brine tank located ten feet from the tracks. Cost of the operation: an expensive 32 man-hours per car. Furthermore, the 60-ton brine tank had to be exhausted down to ten tons before another 50-ton carload of salt could be added, creating problems of reserve and scheduling.

An International Salt Company Technical Service representative and the plant manager solved the situation by installing two 55-ton Sterling Storage Lixators under the existing railroad trestle. Salt drops directly from the hopper cars into them. Gravity supplies the labor, releasing the 32 man-hours. And when the Lixators* get down to 30 tons each, a 50-ton carload tops them off with 25 tons apiece. Ordering is simplified, and the buyer never has to worry about reserve. And how does the salt get to points of use? Simple. The Lixators produce crystal-clear, fully saturated brine *automatically*. Pipes carry it into the plant.

Local contractors competed for the job by sealed bids estimated from complete plans supervised by International's Technical Service Department.

This project is a good example of how International salt engineering can benefit salt users. If you're interested in unequaled technical assistance on any phase of salt handling, storage or dissolving, write International Salt Company, Clarks Summit, Pa., or nearest district office.

*Registered T.M. International Salt Company

BOSTON CHARLOTTE CINCINNATI NEWARK NEW YORK PITTSBURGH
BUFFALO CHICAGO DETROIT NEW ORLEANS PHILADELPHIA ST. LOUIS

INTERNATIONAL STERLING SALT SALT COMPANY

"A STEP AHEAD IN SALT TECHNOLOGY"

That odor you smell is money escaping!

The odorous fumes coming from your plant stacks are probably costing you much more than the good will of your employees and neighbors. For these odors often represent a wasted asset . . . a missed opportunity to lower your costs . . . through conversion of fumes to BTU's for use in processing, plant heating, or other operations.

Hundreds of installations in chemical plants . . . producing a wide variety of compounds including maleic and phthalic anhydride, synthetic fibers, resins, oils, varnishes and many others . . . have proven the economy and feasibility of converting objectionable organic and other combustible waste gases to money-saving fuels through Catalytic Combustion. In this proven process, all-metal catalysts and catalytic systems oxidize these gases by *low temperature, flameless combustion* . . . to give you usable energy and a low temperature, odorless discharge from your stacks.

High pressure processes, such as those for ethylene oxide and nitric acid, provide special opportunities for savings through tail gas power recovery. Incidental benefits often include reduced fire hazards, simplified cleaning maintenance, healthier working conditions . . . and better community relations.

For more details *on the economies possible write Dept. F for this brochure. Or, better yet, give us a few facts on your waste gas problem so we can make specific suggestions.*

CATALYTIC COMBUSTION CORPORATION

4725 Fourteenth Street • Detroit 8, Michigan

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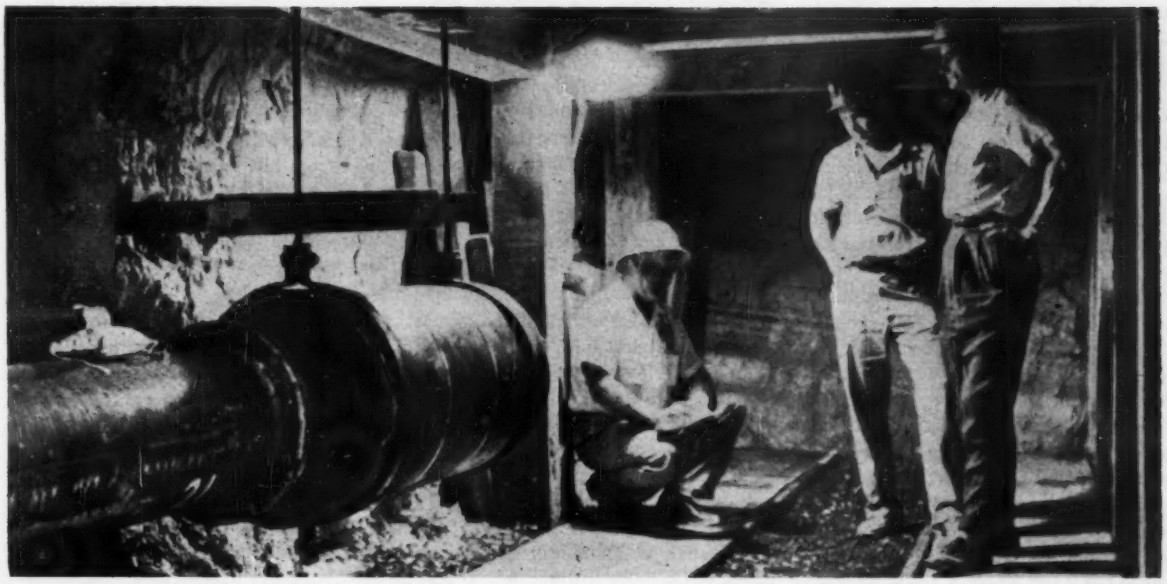
Chemical Week / SEPTEMBER 16, 1961



WIDE WORLD

At Yucca Flats test site, AEC officials examine chamber to be used for Project Wagon explosion.

A-Test Startup Booms 'Plowshare'

Backers of Project Plowshare, anticipating little further difficulty in getting government clearance, this week pressed forward with plans for several experiments aimed at finding industrial uses for nuclear explosions. President Kennedy's decision to resume nuclear testing did not mention Plowshare, but feeling is that underground explosions for peaceful purposes will get the go-ahead when they are ready. Bolstering this view: a pickup in consultations between private and government groups; the long test ban had all but ended such exchanges.

Meanwhile, several programs are moving along on fairly firm schedules.

Before the end of the year, the site for a 5-kiloton, Project Gnome underground test will be ready near Carlsbad, N.M. As soon as clearance is received, the blast will test the feasibility of converting nuclear heat into latent heat for later use in generating electricity, and producing and recovering useful isotopes from the surrounding salt deposits.

Possibly even sooner, a smaller test will be made at AEC's Nevada test site to explore excavation uses of nuclear blasts under a new project called "Wagon."

As early as next spring, an industry-financed test may be made in the Athabaska area of Alberta to recover oil from tar sand under Project Oilsand.

In the next year or so, Project Chariot will form a new harbor in Alaska with four 20-kiloton explosions and one 200-kiloton detonation.

Several other projects are being planned, but so far no test dates have been assigned. These projects include tests to learn the effects of nuclear detonations on chemical reactions, mining, water resources, etc.

Ban Caused Delay: Project Plowshare hardly got under way back in '57 before it ran into the nuclear weapons test ban the U.S. and Britain sought to negotiate with the Russians. This country decided to postpone all testing under the program during the moratorium that started in Oct. '58.

Since then, scientists and engineers working on the project have been confined largely to theorizing about the industrial benefits to be gained from small underground nuclear explosions. No tests have been conducted under Plowshare to date.

Now, however, the program's backers are about to get their chance, and are readying for an active round of testing. Their only fear is that they will get lost in the rush for nuclear weapons testing, or that a new moratorium will come along and halt their work again.

Immediate Projects: Despite the possibility of further delays, the government and industry both are interested in getting the following tests under way.

Project Gnome—Construction work has virtually been completed on a $5-million program designed to explode a 5-kiloton nuclear device in a deep excavation some 30 miles southeast of Carlsbad. Here, a 1,200-ft. shaft has been dug into a salt flat, with a 1,000-ft. tunnel running off the foot of the shaft. The tunnel has been designed to seal off all radioactivity, and none is expected to reach the surface. Original plans called for a 10-kt. shot, but scientists have decided a 5-kt. charge will be sufficient.

Project Wagon—This is to be a forerunner of Project Chariot, which

will study the excavation uses of nuclear blasts. The AEC will not disclose details of Project Wagon, but it is known that a test of "less that 5 kilotons" is to be conducted underground at the AEC's Nevada test site.

Project Oil Sand—Richfield Oil Corp. of Los Angeles and its associates, Cities Service Co. and Imperial Oil, Ltd., have agreed to finance a nuclear explosion in the Athabaska area of Alberta to see if petroleum products can be obtained from tar or oil sands in the area. The oil is too viscous to be removed by ordinary oil exploration methods. This project aims to set off a 9-kiloton device at the 1,300-ft. level—below the deposits. This, it is estimated, would release 9 trillion calories, and force the oil sand upwards, creating a slag-lined sphere about 230 ft. in diameter. After cooling, the sphere would collapse, with the oil sand filling the cavity. Heat would lower the viscosity of the oil to the point where it could be produced by conventional pumping or flowing methods.

The yield from such an explosion is expected to produce several hundred thousand barrels of oil, about what an average well produces. But Richfield plans to conduct several explosions simultaneously to bring the yield up to a paying level. Expected costs: $2-3 million for nuclear devices alone.

Oil companies have drilled more than 1,000 test holes in the area and believe the oil-rich sands underlie a 17,000-sq. mile area and contain as much as 600 billion bbls. of oil. Even if only half can be recovered, Richfield says, it will equal the present known recoverable oil reserves of the rest of the world.

Project Chariot—This $10-million project is designed to learn the uses of nuclear explosions for excavation purposes. It will be used to blast a harbor in a remote secton of Alaska's northwest coast near Cape Thompson. Unofficially, Project Chariot is reported to be the forerunner of plans to blast out a new Panama Canal. If the radiation factor proves to be as minor as the scientists predict, nuclear detonations of this type might be used any place where large excavations are needed.

It will be another year or more before any detonations will be made under Project Chariot, however. Some $2-3 million has already been spent on studies of the area. Scientists want to find out the likely effects on fish and wildlife in the area; what time of the year offers the best weather conditions, etc.

Present plans call for four 20-kt. nuclear blasts at 400-ft. depth to create the channel, then one 200-kt. explosion at 800-ft. depth to carve out a giant harbor.

Other Likely Tests: Beyond these specific programs, scientists are considering several nuclear tests. In chemical and isotope production, they say that a megaton detonation would release approximately 1,000 trillion calories of energy—the equivalent of 150,000 tons of coal. This great amount of heat released underground could form compounds such as lime that would store the energy, which could be tapped gradually.

At temperatures of 10,000 F, elements such as aluminum and silicon form oxides not ordinarily present. Other chemical combinations occur at slightly lower temperatures. Scientists want to find out more about these reactions and their possible industrial application.

Nuclear Mining: Several projects loom in the field of mining. Specialists want to test nuclear explosions for breaking and removing the overburden before ore is mined; breaking up ore in preparation for open-pit mining; breaking ore and cap rock to aid block caving; and breaking ore to permit recovery by circulating solutions to extract minerals chemically.

Fees Set: In anticipation of large numbers of industrial tests of nuclear experiments, the AEC has set up a scale of fees that it will level for such work.

For less than 10-kilotons yield, the charge will be about $500,000.

For explosions of "a few tens of kilotons" in yield, the charge will be around $750,000. Devices of this size would be 30-in. diameter and all fissionable material. Costs would decrease if used in large numbers.

A 5-megaton device, about 60-in. diameter, would cost about $1 million; 5% of the yield would come from fission, 95% from fusion.

Charges would include fabrication of devices, placing them in the firing location, making the firing attachments, firing and conducting studies to assure public safety.

Second in the South

With another Southern acquisition under its belt, Air Products and Chemicals (Allentown, Pa.)—formerly Air Products, Inc. — now appears headed toward a $70-million sales volume in its fiscal year ending this month. This would be a 40%-plus rise from last year's $48.6 million.

In last week's acquisition, the company took over Delta Oxygen Co. (Memphis, Tenn.), producer and distributor of oxygen, nitrogen, argon, acetylene, hydrogen, and welding and cutting equipment. This move—expected to add about $2 million to Air Products' yearly sales—is the second such acquisition engineered by company President Leonard Pool within the past six weeks. The other: Southern Oxygen Co. (*CW Business Newsletter, Aug. 5*).

Delta will be operated as a division, with B. F. Connor continuing to head the business. Main plant and headquarters is in Memphis, branches in Little Rock, Paducah, Ky., Greenwood and Clarksdale, Miss.

Air Products and Chemicals is completing a $35-million plant expansion at five locations that will materially increase the company's capacity for production of liquid and gaseous oxygen, nitrogen, argon and other industrial gases. In addition, the company has launched a joint venture with Tidewater Oil for construction of a 60-million-lbs./year oxo-alcohols plant next to Tidewater's refinery at Delaware City, Del.

Air Products' Pool: Now driving for $70-million annual sales volume.

HURRICANE EXCLUSIVE

How CPI Weathered the Big Blow

Disaster planning on the part of CPI companies on the Gulf Coast was proving its worth this week as many of their plants were starting up again after being hit by Hurricane Carla, probably the most destructive tropical storm to batter the Texas coastline since 1900.

Plants along a more than 300-mile shoreline arc were shut down for periods ranging from hours to days. But there were no personnel casualties reported up to CHEMICAL WEEK's press time, no serious damage to principal operating units and only scattered reports of damage to plant buildings—e.g., part of the roof being blown off the Aluminum Co. of America smelting plant at Point Comfort.

Company officials noted that nearly all plants in the area were designed to withstand the hurricanes that are spawned in the Caribbean Sea at this time of year. And most CPI plant managers on the Gulf Coast have developed emergency plans that have been steadily improved through drills and simulated disasters (*CW, July 27, '57, p. 27*). On top of these measures, companies and employees this time had enough advance warning so that—for the most part—plants could be shut down and families evacuated before the storm struck.

Carla aimed her hardest blows at coastal communities from Galveston to Corpus Christi. Plants in this 180-mile strip took winds of up to 175 mph., and flooding was common, even in plants built on land lying 15 ft. or more above sea level.

Freeport — the biggest chemical plant community in the hurricane belt—was virtually deserted when Carla thundered in from the Gulf on Monday. Dow Chemical's big Plant A and the nearby salt-water conversion plant were flooded when tidal waves smashed a hole in a dike.

Bearing the Brunt: Chemical plants most directly in the path of the hurricane were Union Carbide at Seadrift and Du Pont at Victoria. As the storm's "eye" bore down on them, skeleton crews were standing by to minimize damage. Also in that same locality are Alcoa's alumina and smelter plants; the alumina plant was completely closed and one potline in the smelter was shut down, but up to Monday noon a 100-man crew was maintaining aluminum production in the rest of that plant.

Forty-foot waves and 100-mph. winds buffeted the Galveston Bay area. With power lines down and most employees evacuated, CPI plants there all shut down on Sunday; but by Monday afternoon plant managers were starting cleanup work.

The two largest chemical plants in this vicinity were pillars of their community. Some 350 people took refuge in Monsanto Chemical's Texas City plant and rode out the storm safe and sound there. Union Carbide's Texas City plant—which had a number of sealed tank cars full of water—was one of the community's few sources of good drinking water as the winds and waters began to drop.

Most chemical plants and oil refineries along the Houston Ship Channel were shut down Sunday and Monday, but stand-by crews remained in the plants throughout the storm period and damage was slight. At the Rohm & Haas plant, for example, there was no flooding or serious wind damage, and officials expected to resume production Tuesday provided electric power was back on.

Humble Oil's giant refinery and petrochemical works at Baytown was completely shut down Monday. Thirteen-foot tides were causing some flooding in the plant's dock areas.

In the Laporte locality, southeast of Houston, Du Pont and Sinclair closed their plants Sunday, but this community escaped the 100-mph. winds that raged some 20 miles to the southwest. Startup preparations got under way Monday afternoon.

Farther to the east, the hurricane's side effects tapered off rapidly. Plants in the Beaumont and Port Arthur region, for example, continued to operate normally. From Allied Chemical came a report that winds there were up to only 30 mph.

Freeport Sulphur Co.—whose facilities are all in Louisiana—shut down four of its five Frasch mines a day or so early, and employees were sent inland for safety—particularly those assigned to Freeport's off-shore mine at Grand Isle, La. But an aerial inspection Monday noon showed that these plants were undamaged, and startup work began that afternoon.

Biggest test of CPI preparedness was to come when Carla's swirling center struck the mainland between Port Lavaca and Corpus Christi. Hours before that time, communications were cut off; for example, Teletype lines between the Celanese plant at Bishop, Tex., and the district office at Houston went down Monday morning.

But by Monday night it was clear that the great bulk of the Gulf Coast's CPI had weathered the storm. As Carbide management pointed out, the big concern now is the employees' resettlement problems.

Upping Stake in Solids

With solid propellants now expected to take an increasing share of the growing U.S. rocketry market over the next few years, Lockheed Aircraft Corp. (Burbank, Calif.) last week moved to take over Grand Central Rocket Co. (Redlands, Calif.), producer of solid-propellant engines.

Previously, Grand Central was owned by Petro-Tex Chemical Corp. (Houston, Tex.). Lockheed bought a 50% interest in Grand Central in early '60 and now will make it a wholly owned subsidiary. Last year Grand Central's sales amounted to $9.5 million, but this was down from prior years because of the phase-out of the company's big Nike-Zeus contract.

One likely reason for Lockheed's desire to make the move at this time: prospects for solid-propellant rocket engines based on Grand Central's Polycarbutane propellant, a polybutadiene. It's to be used in solid fuels along with an aluminum energy additive and the conventional ammonium perchlorate oxidizer.

Lockheed management officials may be thinking of an early chance to cash in on Polycarbutane. It's specified by Grand Central as the fuel for its seven-segment, 13.5-ft.-diameter engine designed to provide a 3.25-million-lbs. thrust. Major contracts for the big booster program — including the Project Apollo men-to-the-moon rocket — are expected to start flowing this fall.

Cashing In on Chemicals

W. R. Grace & Co.—which started diversifying into chemicals just 10 years ago—last week found its chemical sales running at an annual rate of nearly $250 million, up almost 10% from last year's $229.4 million.

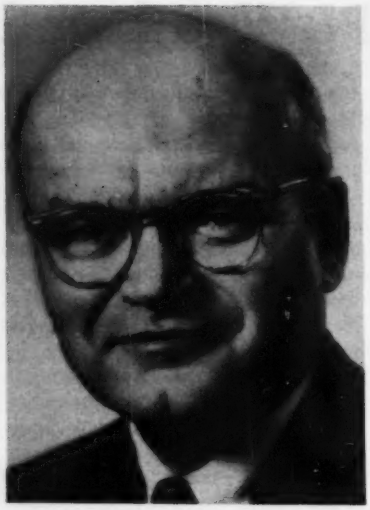
And this does not include the petrochemical sales of its 53%-owned Cosden Petroleum Corp., which—in the fiscal year ended last April 30—totaled more than $10 million.

Both companies this week are launching new chemical ventures. Grace—whose chemical operations are directed by Executive Vice-President O. V. Tracy, formerly president of Esso Standard Oil—has decided to build a plant at Barcelona, Spain, to produce container sealing compound; and has started an expansion at São Paulo, Brazil, to quadruple capacity for phthalic anhydride production (*CW, July 1, p. 16*).

Cosden is setting up a new, wholly owned subsidiary to be known as Cosden Petrochemical Corp. (New York). It will be headed by Franklin E. Eck, who has been serving as Cosden's marketing manager for chemicals and plastics. Eck—who holds a chemical engineering degree from Notre Dame and a business administration degree from Harvard—previously worked for Spencer Chemical and American Cyanamid.

Initial assignment for Cosden Petroleum will be to "perform marketing advisory services." Cosden's principal products: *o-*, *m-* and *p*-xylenes; polybutene, styrene, polystyrene and "a new polymer used in making vinyl resins and plastics."

For both Grace and Cosden, chemicals loom disproportionately large in the income column. For Grace, chemicals accounted for about 48% of sales but brought in 76% of pretax operating profits in calendar year '60. Cosden President R. L. Tollett points out that production of petrochemicals took only 4.4% of the company's refinery input during the past fiscal year, but that Cosden's cost accountants estimate that 25% of net income should be credited to petrochemicals. In the preceding fiscal years, chemicals accounted for 64% of Grace's profits and 18% of Cosden's.



Grace's Tracy: Delving deeper into chemical business.

And for both companies these trends are continuing. In the six months ended June 30, Grace's profitability staged a rise with corporate sales dipping 3.4%, to $272.7 million, while net operating income jumped 20.8%, to $8.7 million—and chemicals accounted for an increased proportion of both sales and earnings. In the three months ended July 31, Cosden's sales and operating revenues rose 6%, to $21.8 million; but earnings climbed to $1.15 million, a gain of 13%—despite the downward trend in gasoline prices.

By way of celebrating its arrival at the $250-million mark in chemical sales, Grace has published a brochure that includes previously undisclosed financial details of this side of the company's business. Sales of agricultural chemicals, it reveals, have increased by an annual average of 2.8% over the past five years, to last year's $67.8 million. Sales of industrial chemicals have mounted 14%/year, from $95.7 million in '56 to $161.6 million in '60.

The company's chemical sales in the U.S. and Canada have grown 8.5%/year, to $202 million; but overseas sales have vaulted 27.5%/year, to $27.4 million. Chemical research expenditures have grown by an average of 12.2%/year, to $10.3 million; and cash flow (net income plus depreciation) from chemical operations rose 10.5%/year, to $27.9 million.

Route for Recappers

Use of carbon black-masterbatch synthetic rubber will enable tire recapping companies to produce tire tread (camelback) in competition with major tire companies, a rubber industry sales executive predicted last week.

Within 15 years, says D. A. Reneau, Memphis district sales manager for United Carbon Co. (New York), major recappers will take over a principal role in making camelback.

"The economics dictate this development," Reneau declared in digressing from a talk at the American Chemical Society's national meeting in Chicago. "Via the black masterbatch route, it is possible for a recapper to produce tread without the prohibitive capital investment and operating costs of a Banbury (unit). By purchasing a few mills and extruders, the recapper can produce quality tread with substantial savings."

Reneau predicted two more plants to produce polybutadiene and polyisoprene, one more tire plant and four more molding and extrusion plants will be built by the rubber industry in the South in the next few years.

Lengthy Trial on Tap

A protracted trial of the antibiotic antitrust suit appeared probable this week following the entry of "not guilty" pleas by all defendants in a brief court appearance last week.

Defendants entering those pleas: Chas. Pfizer & Co. and its president and board chairman, John E. McKeen; American Cyanamid and its board chairman, Wilbur G. Malcolm; and Bristol-Myers Co. and its president, Frederic N. Schwartz. The Dept. of Justice charges them with conspiring to fix prices and restrain trade in broad-spectrum antibiotics (*CW Business Newsletter, Aug. 26.*).

The pleading procedure before U. S. District Judge John M. Cashin in federal district court at New York took less than two minutes. No date was set for start of the trial. Judge Cashin immediately released the three individual defendants in their own recognizance.

Olin Mathieson's E. R. Squibb division and Upjohn Co. were not included in the indictment, but were named as coconspirators.

For Brazil, More Strife?

Brazil's political crisis, triggered by the resignation of President Janio Quadros, was settled last week with the inauguration of his successor and the establishment of a new, parliamentary form of government. But though the immediate threat of civil war has subsided, U.S. chemical companies with interests in Brazil will have good reason to be wary for a long time to come.

Under Brazil's constitution, Quadros' successor was to be Vice-President Joao "Jango" Goulart. But, alarmed by Goulart's record of demogogic vote-seeking from the extreme Left, Brazil's military chiefs tried to block his way to the nation's top office. This created a storm of protest among Goulart's supporters and those who were most concerned with preserving constitutionality. Part of the army revolted, and the nation veered perilously close to civil war.

A compromise saved the day. The Chamber of Deputies (Brazil's Congress) rushed through a constitutional amendment changing the form of government, making the President little more than a figurehead and giving executive authority to a Premier and Cabinet. Goulart, as President, was left the role of selecting the Cabinet and Premier, with Chamber approval.

Trouble Ahead? Although this compromise ended the immediate threat of bloody chaos, it marks only the beginning of a dangerously unsettled period for Brazil.

The crisis has had the effect of polarizing (or at least illuminating) the split between Brazil's powerful Left and Right forces. Although the military chiefs succeeded (for the time being, at least) in divesting Goulart of traditional Presidential power, the fact that he holds office at all reflects their need to compromise with the Left. Fear of a leftist rebellion, in fact, lay behind the call of many conservative elements for preservation of "constitutionality."

The selection of Tancredo Neves as Premier is also seen as a conciliatory move to the Left. Neves is considered a conservative, but, like Goulart, was a member of dictator Getulio Vargas' regime, hence acceptable to the Left. Neves lacks a powerful political personality, and may well be dominated by a stronger man or group.

New President Goulart lacks authority, but may prove a potent voice.

Despite his nominal stripping of power, much may depend on Goulart. Although branded as a "leftist," he is more accurately described as a political opportunist, a rich landowner who has bought support from the Communists and tolerated corruption. The danger is that radical elements may take control of his Labor party and use him as an instrument of power. Goulart still has the power to create trouble. He can, for example, call for a referendum on bills rejected three times by Congress. Already he has suggested a referendum on the new government setup, though this is not scheduled until his term is nearly up.

How Goulart will behave is still a matter of conjecture. But it seems certain that the Left has gained a stronger voice, that the vital program of economic stabilization (anathema to the Left) has been set back, that concessions to nationalism and anti-Yanquiism are strong possibilities. Necessary land and tax reform may be pushed through, but the economic organization and discipline necessary to make them productive could go by-the-board.

Perhaps more important is the question, Can a parliamentary government survive in politically fragmented Brazil? And if it doesn't, what will take its place?

Asking a Free Hand

Antitrust lawyers in the U.S. Dept. of Justice this week are putting together a document that will indicate whether the Du Pont-General Motors case is heading toward a quick and quiet ending or another round of conflict and appeals.

This Justice Dept. paper — due to be filed in the U.S. district court at Chicago in about two weeks — will be the government's reply to a Du Pont statement filed in Chicago last week. In essence, Du Pont is asking for a virtually free hand in disposing of its 63 million shares of GM stock over the next 10 years — as directed last spring by the U.S. Supreme Court (*CW, June 3, p. 21*).

If the government is willing to let Du Pont shed the stock with a minimum of restrictions as to methods and timing, then there should be no difficulty in arriving at a final decree within a few months. But if the Justice Dept. insists on terms that would tend to force Du Pont to dump its GM stock at a sacrifice, then another court fight would be in prospect.

The proposed decree submitted to District Judge Walter J. LaBuy by Hugh B. Cox, chief counsel for Du Pont, calls for Du Pont to divest itself of the GM stock "by distribution to [Du Pont] shareholders or by such other means as [Du Pont] shall select."

Divestiture would be completed within 10 years after the final decree is issued, and during the divestment period the GM stock held by Du Pont would be voted by Du Pont stockholders on a *pro rata* basis. Du Pont would be enjoined from using the stock to influence or control GM, from acquiring additional GM stock (except through stock splits, stock purchase rights, etc.), and from having as director or officer any person who has served as a GM director or officer after Feb. 15, '60.

Du Pont would give the Attorney General advance notice of any disposition of stock, except through sales on registered stock exchanges; and if the Attorney General should object, the disposition would not be carried out without court approval. And the court would retain jurisdiction so that either party could ask for new terms — such as might be necessary if Congress should enact new tax legislation.

national roundup

Rounding out the week's domestic news.

Companies

Diamond Alkali Co. (Cleveland) has completed its merger with Bessemer Limestone and Cement of Youngstown, O. (*CW, April 22, p. 17*). Shareholders approved the action last month.

Thiokol Chemical (Bristol, Pa.) has received a $1.03-million contract to produce LR 62 packaged liquid rocket engines for the U.S. Navy's Bullpup air-to-surface missile. Production will be handled by the company's Reaction Motors Division at Denville, N.J.

Worth Chemical Products (Fort Worth, Tex.) has established a water-treating chemicals division, Dearborn Aqua-Serv of Texas. The new company will operate in north and west Texas under a franchise from Dearborn Aqua-Serv Inc., division of Dearborn Chemical Co. (Chicago).

Henze Chemical Corp. (New York) has been formed to handle export and import of pharmaceutical raw materials, intermediates, coal tar derivatives and other chemicals.

Drew Brown Ltd. (Toronto), a Canadian export-import house, is opening a Calgary, Alta., branch to trade in Canadian elemental sulfur.

Expansion

Uranium: Petrotomics Co.—a partnership of Tidewater Oil, Getty Oil, Skelly Oil and Kerr-McGee Oil Industries—has started construction of a 500-tons/day uranium mill in the Shirley Basin area, 60 miles south of Casper, Wyo. The $2-million acid leach-solvent facilities are due onstream next April. Petrotomics is developing the area under a five-year AEC contract.

Salt: Canadian Salt Co. is building a $2-million salt refining and processing plant at Pugwash, Nova Scotia. Completion is expected in the second half of '62. The company operates a salt mine in the area and recently completed a marine terminal capable of handling ocean-going vessels.

Coatings, Resins: Glidden Co. (Cleveland) has approved a $1-million expansion and modernization program for its resins and coatings plants at Atlanta, Chicago, St. Louis and Toronto. Aim: a 25% boost in over-all capacity.

Cellulose: American Viscose Corp. (Philadelphia) has selected Newark, Del., as the site of its proposed plant to produce Avicel, an edible microcrystalline cellulose product for use in diet foods (*CW, June 24, p. 45*). The first unit of a "multimillion-pound" plant is due onstream next January, with increases anticipated if Avisco is successful in its search for a hookup with a large food products company.

Propane, Butane: Steelman Gas Ltd., managed by Dome Petroleum Ltd. (Calgary, Alta.), plans to build a $1.6-million hydrocarbon extraction plant near Edmonton, Alta. Feedstock will be the gas stream transmitted to Edmonton in pipelines owned by Northwestern Utilities Ltd. The unit, due onstream in fall of '62, will process 70 million cu.ft./day, extract 45,750 imperial gal. of propane and 16,240 imperial gal. of butane daily.

foreign roundup

Rounding out the week's international news.

Petrochemicals/Spain: INI—Spain's state-owned industrial agency—will build a petrochemical plant alongside its proposed refinery at Puertollanos. Yearly output: 45,000 tons of nitrogen fertilizers; 90,000 tons of chemical products.

Plastics/Germany: The recently founded Kohle-Oelchemie Gmbh. reportedly has shelved plans for a $25-million plastics plant at the Rhine-Herne canal. Trade sources cite heavy investments by other plastics producers in the area as the reason behind the holdup.

Fertilizer/Red China: Peking Radio has revealed a nationwide agricultural program that includes construction of eight new fertilizer plants and expansion of seven existing ones.

Nanking Chemical Industry Co. is one of those expanding. The report said the country's chemical industry is allocating 41% of its '61 capital construction investment to chemical fertilizer production (the expansions above are to be carried out this year)—more than in any other year since '49.

Acetone Derivatives/Union of South Africa: Kolchem Ltd.—joint venture of Sasol (state-owned oil-from-coal producer) and National Chemical Products Ltd.—is starting production at Germiston, near Johannesburg. The highly automated plant will process acetone into diacetone alcohol, mesityl oxide and methyl-isobutyl ketone. Work will start soon on two other plants—for pentaerythritol and hexylene glycol.

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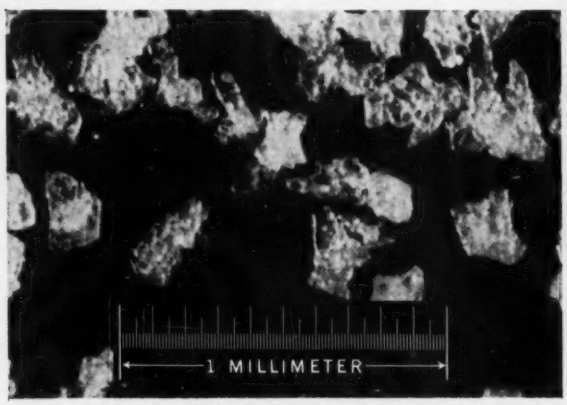
CUMULATIVE PERCENT RETAINED BY

170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



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65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

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TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

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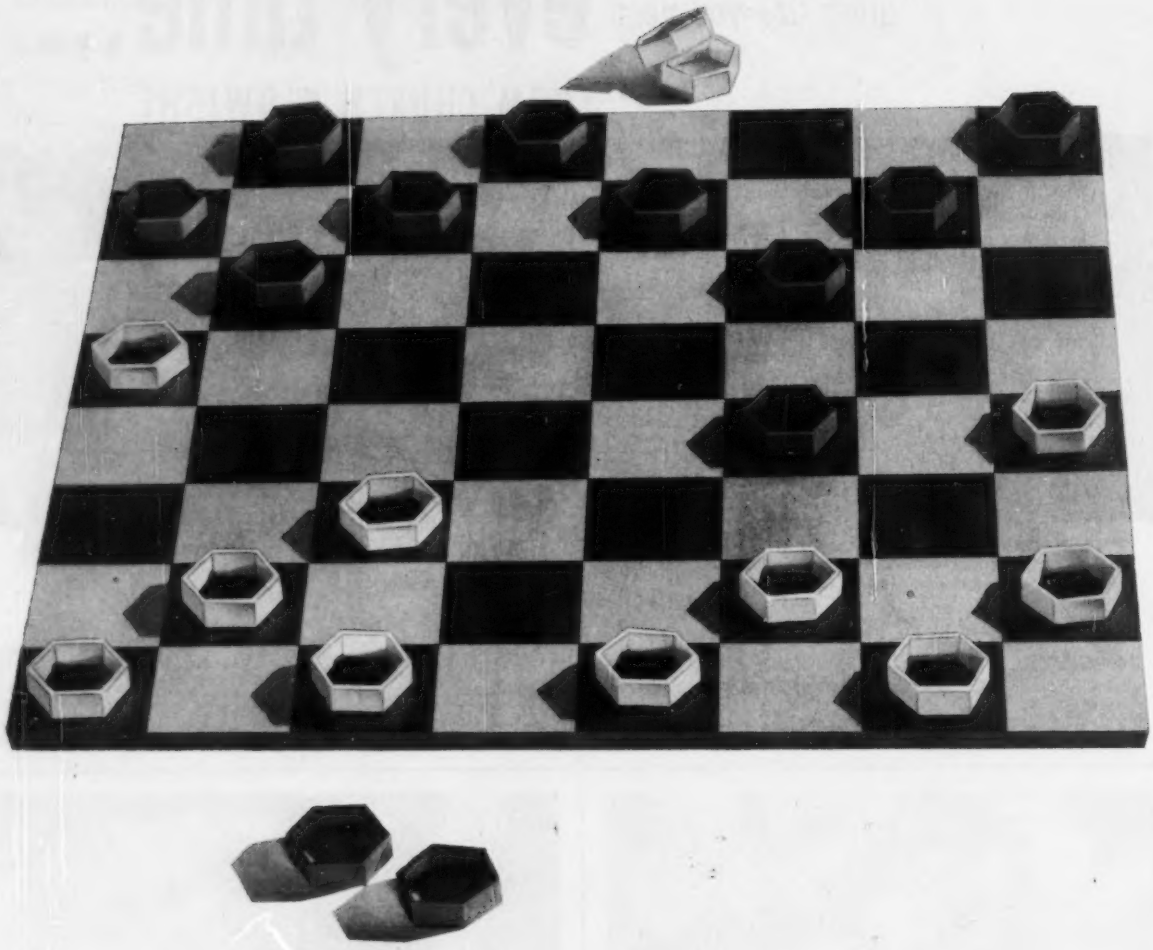

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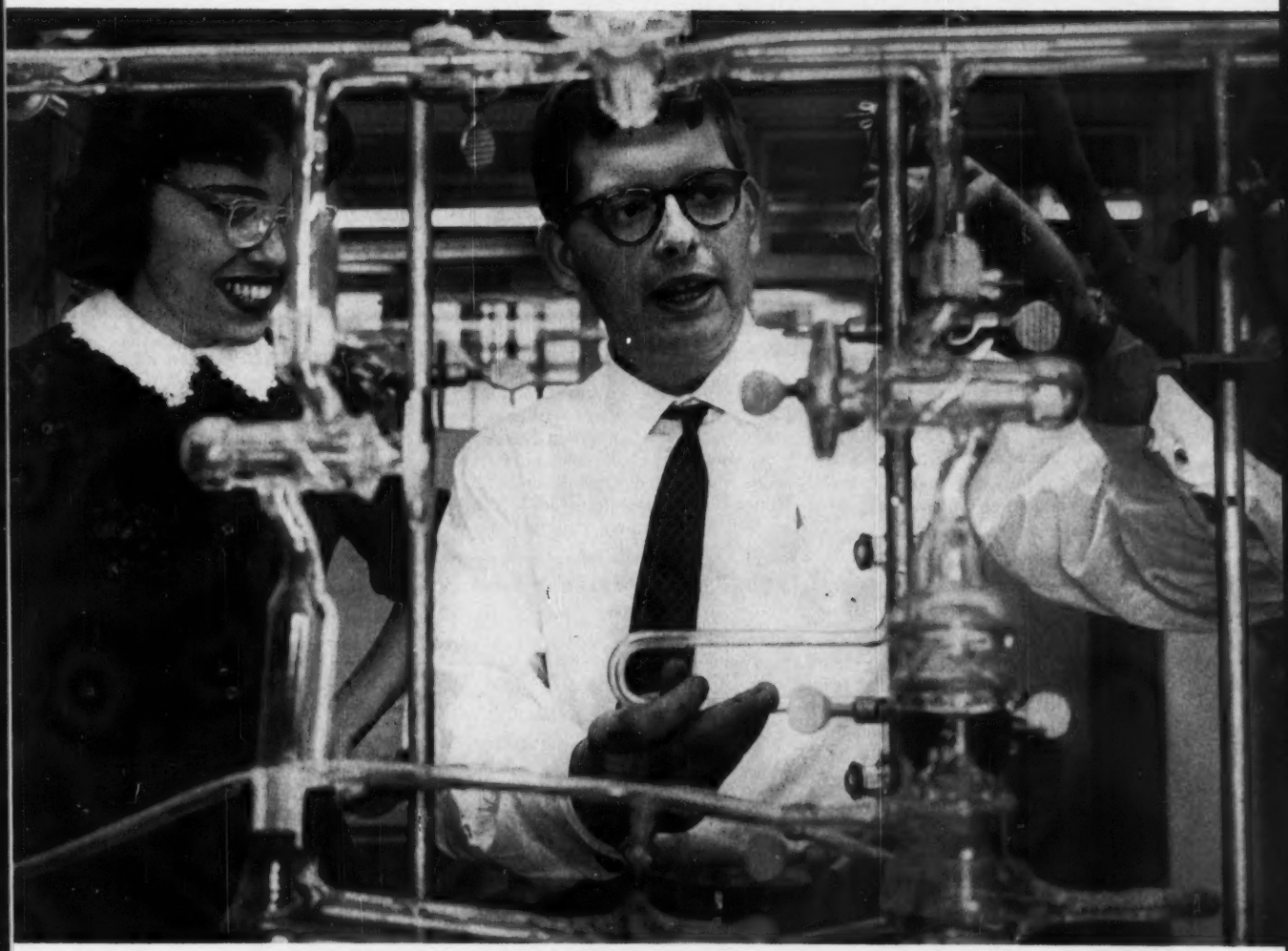


Cyanamid researchers Marilyn and Joseph Leto seek new routes to inorganic coordination polymers.

Eyeing New Profits in Complex Chemicals

Coordination chemistry is turning out to be a versatile master key to research advances in a sweep of projects ranging from high-temperature-resistant polymers to theories of catalysis. This research ferment is yielding a spate of fresh patents to companies in many nations.

The principal advantage conferred by coordinate bonding is strength under demanding circumstances. Coordinate-linked polymers, for example, that withstand temperatures well above 500 F—better than the maximums of the toughest conventional resins—have been made in the laboratory. Most lack workability. But with military services pressing hard for such products to use in insulators, heat transfer media, jet lubes, nose cones and the like, the present hurdles will likely be cleared.

Complex Bonding: Coordination bonding, as now described (*see Dimension, p. 34*), embraces both the organic and inorganic fields of chemistry. Current work—typically on metalorganic chemistry—is the outgrowth of Alfred Werner's pioneering research on complexes that dates back to 1893.

In the years since, techniques for producing coordinate linkages have increased considerably. Iral B. Johns, a senior scientist at Monsanto Research Corp. (Everett, Mass.), a subsidiary of Monsanto Chemical Co., has produced polymers that are stable at 500 C (932 F) by three different methods.

These polymers are chelates of a triazine derivative — tris(2-hydroxyphenyl)-sym-triazine. There are three active sites on the triazine, two of which "coordinate" with divalent, tetracoordinate metal ions. This coordination can be achieved by (1) adding a solution of the metal acetate in methanol to a solution of the triazine in dimethylformamide and digesting the mixture 15 minutes at 60

C; (2) heating the metal acetylacetonate and the triazine in a vacuum to 250 C; and (3) mixing anhydrous metal halide with the triazine and heating under nitrogen for six hours at 315-330 C. Chelates with zinc, beryllium, manganese, iron, cobalt, nickel, copper, lead or magnesium have been prepared—zinc and beryllium chelates can be heated one hour at 500 C without measurable changes in infrared spectra. But the problem that Monsanto now faces is how to fabricate the polymer into usable shapes. And solving this may be a formidable task.

Laminating Resins: A second recent development at Monsanto has also been based on coordination theory. Lucius Gilman and his associates have come up with a high-temperature-resistant laminating material; it's a linear coordination polymer of zinc with methylene bis(salicylaldehydeimine) containing butyl substituents on the imine nitrogen atom. This polymer can be cross-linked with diamines by substitution of the butyl groups.

A glass-cloth laminate made with the imine resin has good thermal stability at 500 F. But it does not have good flexural strength. The current emphasis is on improving this property and, at the same time, making the resin stable at still higher temperatures; 700 F is the next goal. Among modifications being tried: putting different functional groups on the backbone of the polymer and applying new polymerization techniques.

More Hot Polymers: Pennsalt Chemicals Corp. (Philadelphia) has also been seeking high-temperature-resistant coordination polymers (*CW, March 12, '60, p. 57*) for the last three years or more. To achieve high-temperature stability and resistance to oxidation, it has made metalorganic polymers with chromium and phosphorus, as well as with zinc and beryllium.

Using diamminedichloro zinc, polymers corresponding to the empirical formula $ZnCl_2NH_3$ have been made. These are transparent glassy solids at room temperature with heat stability under 400 F. All of this work in coordination polymers is being done at Pennsalt under grants from the Office of Naval Research.

Catalysis Tipoff: Besides making new polymers possible through direct synthesis, studies in coordination chemistry are leading to further understanding of catalysis—and thus better polymers. Herman Mark of the Polytechnic Institute of Brooklyn credits coordination complex catalysts with leading to the production of many new polymers from olefin, diene, vinyl and acrylic monomers.

An example of Mark's studies is the use of coordination theory to explain part of the polymerization of conjugated dienes with Ziegler-Natta catalysts.

At American Cyanamid Co.'s research center (Stamford, Conn.), Joseph Leto and wife Marilyn (*cover*) are using coordination chemistry to develop catalysis theory with the aim of devising stable new polymers. He comments that coordination polymers can be made from inorganic monomers that are highly reactive, compared with their organic cousins. This

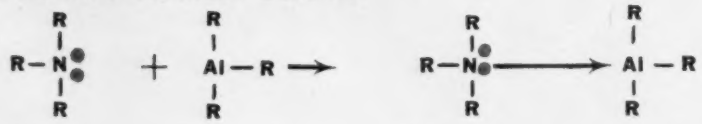
DIMENSION

What Coordination Chemistry Entails

The distinctive feature of coordination chemistry is the coordinate covalent-bond—that in which both electrons are supplied by one atom. (In ordinary covalent bonds and ionic bonds, both of the atoms being joined contribute electrons.)

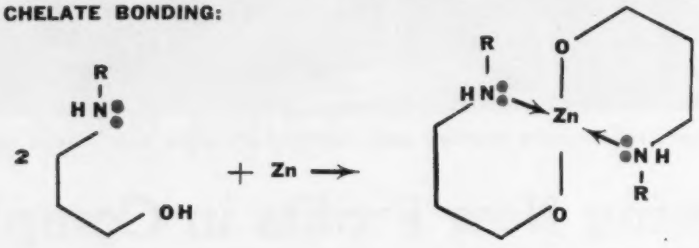
Coordination compounds can be wholly inorganic or largely — but not completely — organic. Generally, a metal atom is joined to four or six atoms or radicals by both ordinary and coordinate covalent bonds. Polymer systems can be built in this way.

COORDINATE COVALENT BONDING:



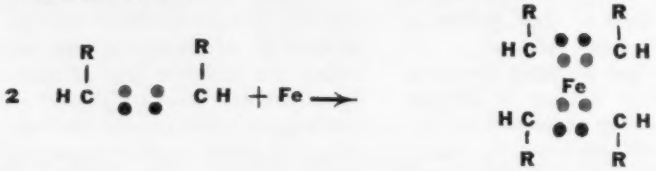
Nitrogen, which has one unshared pair of electrons, is a common partner in coordinate covalent bonds. In the example shown, electrons fit into unfilled outer shell of an aluminum atom. Oxygen is also an electron donor.

CHELATE BONDING:



A chelate is a ring compound in which the ring-closing link is a coordinate covalent bond. In the case above, the nitrogen atoms form coordinate covalent bonds with the zinc atom. Many other metals can form chelates.

π (*PI*) BONDING:



Two of the electrons in an olefinic double-bond—known as π electrons—have a higher energy level than the other two. Bonds between these electrons and metal atoms are π bonds. The electron interchange is complex.

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Illinois' Bailar: Developing new ways to produce coordination polymers.

Monsanto's Johns: Looking for workability in polymers stable at 500 C.

reactivity may mean that new fabrication techniques will be needed to produce the stable polymers.

Ferrocene Push: Ethyl Corp. (New York) has recently offered commercial quantities of a type of coordination compound (*CW, Aug. 5, p. 96*). The compound, ferrocene (dicyclopentadienyl iron), is held together by π (*pi*) bonds, which are a type of coordination bond (*see Dimension, p. 34*).

Ethyl's installed capacity for ferrocene is several hundred thousand pounds/year, can be readily expanded.

The main use for ferrocene will be in combustion control additives, although it can also be used to make high-temperature lubricants, thermally stable polymers, ultraviolet absorbers and radiation-resistant polymers.

Since it was discovered in '51, ferrocene has led to the synthesis of several other organometallic "sandwich" compounds—so named because ferrocene consists of an iron atom sandwiched between two cyclopentadienyl rings lying in parallel planes.

Derivatives of ferrocene were recently patented by Imperial Chemical Industries, Ltd. (London). British patent 869,058 states that tert-alkylferrocenes are made by the interaction of tert-alkylcyclopentadienyl alkali metal derivatives and an anhydrous iron halide. And, according to British patent 870,949, ferrocene derivatives are produced by reacting anhydrous iron halides with ethylcyclopentadiene derivatives in the presence of a strong organic base.

Wyandotte Chemical Corp. (Wyandotte, Mich.) has also studied compounds based on ferrocene. With liquid siloxanylferrocenes, which boil above 450 C (842 F), good thermal stability was shown at 366 C (691 F). Best high-temperature stability was attained with 1,1′-bis(5-phenylhexamethyltrisiloxanyl)ferrocene. Silicon-ferrocene compounds are also under development by the U.S. Air Force, which has been studying ferrocene compounds for five years.

Widespread Hunt: The principles of coordination chemistry are applied in many labs. At the U.S. Naval Ordnance Laboratory (Corona, Calif.), trimethylamine complexes of certain alkyl aluminum hydrides have been synthesized. Metal & Thermit Corp. (Rahway, N.J.) is using the coordination theory primarily as a tool for measuring bond angles and bond energies. And at Farbenfabriken Bayer AG. (Leverkusen, Germany), borohydrides of cationic, complex-bound heavy metals have been used in producing catalysts and as reducing agents, according to British patent 871,202.

John C. Bailar, Jr., professor at University of Illinois and chairman of the recent coordination chemistry

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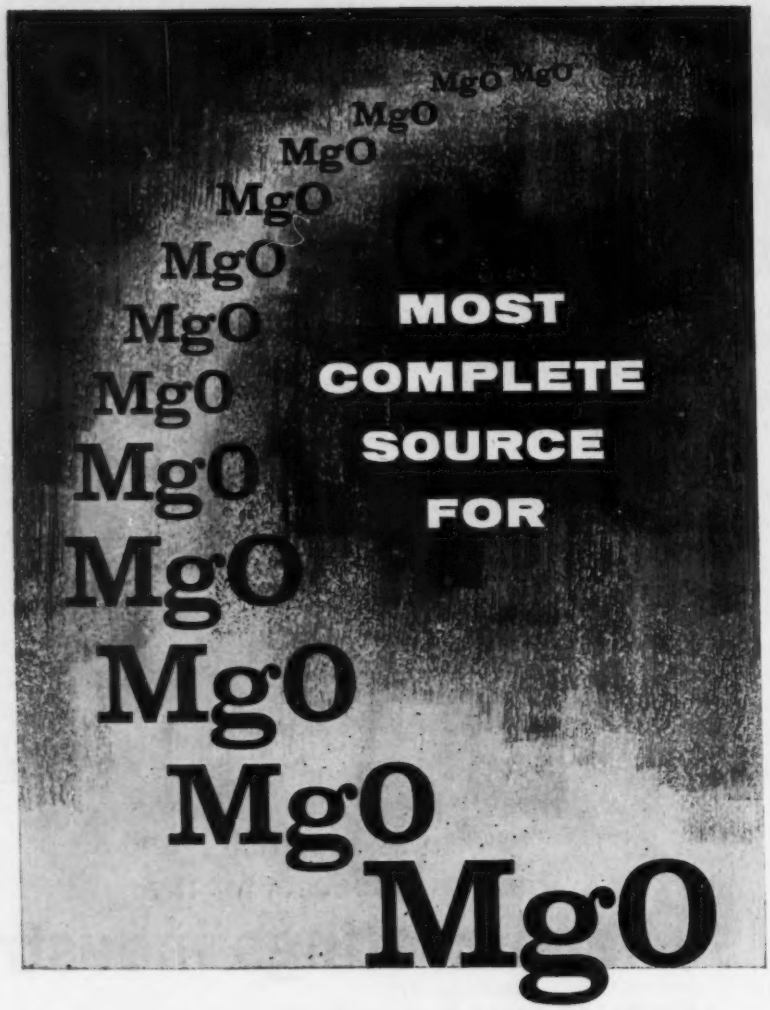

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conference at Detroit's Wayne State University, comments: "Coordination chemistry is contributing useful knowledge to fields including polymers, catalysis, corrosion-resistance, biology, dyes and pigments."

At a recent symposium on inorganic polymers, at the University of Nottingham, Bailar laid down some guides to stable coordination polymers: (1) coordination bonds should be as covalent as possible; (2) stability toward hydrolysis, heat and oxidation are not related and may be mutually opposing; (3) coordinated metal bonds cannot be expected to protect long substituent chains; (4) a polymer in which the nonmetal portions have charges to internally neutralize positive charges of the metal cation should be used; (5) the stereochemistry and the stabilizing influence of chelation must be taken into account.

Much of Bailar's work has been supported by the Air Force for several years. He expects that the key to making high-temperature polymers —his main work—lies in developing the polymerization techniques.

Despite the important objectives achieved so far through coordination chemistry, a breakthrough is needed. The concentrated work at many chemical companies and universities seems almost certain to produce it—but when is anybody's guess.

World Solar Progress

The conversion and concentration of solar energy were key areas of interest at the recently concluded United Nations Conference on New Sources of Energy held in Rome.

Sections of the meeting were also devoted to wind power and geothermal energy. But perhaps the greatest importance to chemical-minded attendees from the U.S. were papers on the conversion of solar energy into electricity by solar cells, thermoelectric (and thermionic) converters and fuel cells, and the utilization of concentrated solar heat and light in solar furnaces.

Thin-Film Cells: Most notable trend in solar cell development is the switch to polycrystalline thin films as the route to cheaper cells. Although single-crystal silicon provides greater efficiency (close to 15%), the lowest projected price for such units, mass produced, is $100/watt. Several

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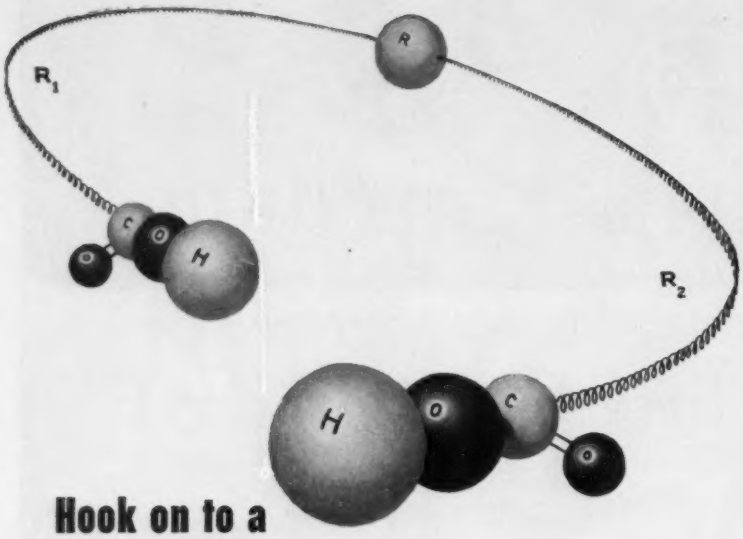

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companies are investigating ways to make the polycrystalline cells, which sacrifice efficiency, but appear to be much cheaper.

A strong contender in the polycrystalline field is cadmium sulfide, which has shown efficiencies up to 6%. Firms reporting on results with this material and with other compound semiconductors were Hoffman Electronics Corp.'s Semiconductor Division (El Monte, Calif.), Itek Corp. (Lexington, Mass.), RCA Laboratories (Princeton, N.J.) and Heliotek Corp. (Sylmar, Calif.).

Hoffman's M. B. Prince reported that his company had best results in making thin films of silicon by pyrolytic decomposition (rather than vacuum deposition or electrolytic plating). Large crystallites have been deposited on various substrates, and single-crystal films have been grown on substrates of single-crystal silicon.

Other Converters: Thermoelectric and thermionic solar conversion systems also drew interest at the meeting. Silicides of transition metals (elements with incomplete inner electron shells, e.g., iron) are under study at Nippon Electric Co. Ltd. (Tokyo, Japan) for use as thermoelectric elements. These materials are said to be abundant, suitable for use at higher temperatures and at lower-purity levels than are common in semiconductors.

Conventional bismuth telluride is used in a series of French test generators; the program is part of a plan to develop a practical home generator. Sponsor is the Solar Energy Study and Industrial Application Society (Neuilly-sur-Seine, France).

Differing opinions on the possibility of making practical thermionic solar conversion systems were voiced at the meeting by General Electric's V. C. Wilson and Massachusetts Institute of Technology Professor George Hatsopoulos, who is also president of Thermo Electron Engineering Corp. (Waltham, Mass.). Wilson concludes that such a system could be built with over-all efficiency of 9.5%, and notes that this would be a costly system. Hatsopoulos, on the other hand, envisions inexpensive generators with over-all efficiency of 17%.

Energy Storage: Because of the intermittent nature of solar energy, regenerative fuel cells (*CW, May 27, p. 43*) are being studied as possible energy storage devices. Francis Bacon

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of Britain's National Research Development Corp. and George Evans of Union Carbide Corp.'s Parma, O., laboratory both reported that hydrogen-oxygen fuel cells might be used for storage of solar energy. And MSA Research Corp.'s (Callery, Pa.) Robert Warner and Thomas Ciarlariello said work on the lithium hydride cell is far enough along to indicate practical units within two or three years.

New fuel cell systems reported by Roland McCully of Armour Research Foundation (Chicago) involve silver and manganese oxides (primarily solid system) or antimony and tin chlorides (liquid system). However, McCully concludes that such cells would not be economically feasible without mass production, in spite of simplicity and conversion efficiency.

The sun's light energy can also be stored by using a photolytic cell, according to Rudolph Marcus and Henry Wohlers of Stanford Research Institute (Menlo Park, Calif.). However, fused salts (such as silver chloride) will likely be needed, since heats of recombination of photolysis products in solution are not high enough.

Solar Furnaces: In another paper, the same two SRI researchers describe the use of a solar furnace as a means of producing intense light for photolytic syntheses.

Intense heat (e.g., 3000 C) was the goal of most of the solar furnace researchers however. The Solar Energy Laboratory (Montlouis, France) of the National Center for Scientific Research (CNRS) contributed half a dozen papers on topics ranging from improved methods of measuring temperatures in the furnace to the production of novel rare-earth compounds under high vacuum in the solar furnace. In a summary paper on practical applications, CNRS's F. Trombe and M. Foex figure that a 1,000-kw. furnace would have an optimum efficiency in terms of the amount of refractory oxides that could be melted in a given time (2-3 tons/day). Solar furnaces are particularly useful for treating oxygen-containing materials because they are normally operated in air, an oxidizing atmosphere.

U. S. contributions on thermal uses for solar furnaces came from Arthur D. Little, Inc. (Cambridge, Mass.), Avco Corp. (Wilmington, Mass.), Quartermaster Research & Engineering Center (Natick, Mass.).

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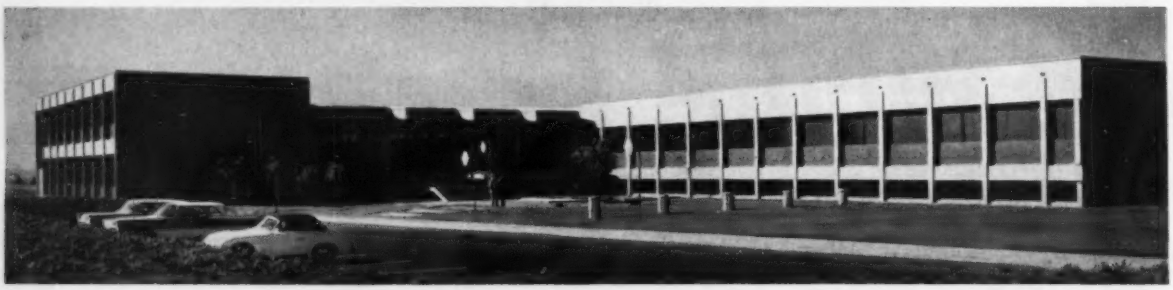

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FURNITURE SHOW: ADHESIVE DIVISION AND STAUFFER-HEWITT, INC.

National Association of Furniture Manufacturers, September 16 through 19, Exposition Hall, Conrad Hilton Hotel, Chicago, Booths 55 and 56. See molded, slab and cut parts of urethane foam, products of Stauffer-Hewitt, Inc., owned by Stauffer Chemical Company and Hewitt-Robins, Inc. Also, Stauffer adhesives including Lustraglues—animal glues—and new "Express" PVAc adhesives. Be sure to register at the Stauffer Booth. Drawings will be made daily for prizes.

ROCKET SHOW: METALS DIVISION, ANDERSON CHEMICAL DIVISION AND TEXAS ALKYLS, INC.

Stauffer's space age activities will be represented in the American Rocket Society's "Space Flight Report to the Nation" at the Coliseum in New York, October 9 through 15, Booth 275. You'll see electron beam furnace operations, custom-made ultra-pure metals and aluminum alkyl products. You can get data on igniters and pyrophoric fuels. Also, info about metal coatings from pentachlorides of columbium and tantalum. Be sure to stop by the Stauffer Booth.

METAL SHOW: STAUFFER METALS DIVISION

American Society for Metals, Cobo Hall, Detroit, October 23 through 27, Booth 456. Stauffer will show high-purity electron beam furnace metals and alloys produced by our Metals Division. We may set up and operate a small electron beam furnace. Whether we do or not, a new movie is supposed to be finished in time and we will show it. Also, you can get info about metal coatings from pentachlorides of columbium and tantalum. Stop by.

CHEMICAL SHOW: ALL STAUFFER DIVISIONS

The 28th Exposition of Chemical Industries, New York Coliseum, November 27 through December 9, Booths 928, 930, 932, 934, 959 and 961 on the third floor. We expect to have several new chemicals to talk about—some from the Victor research labs, others from our newly dedicated center at Richmond, Calif. As a special inducement, we're planning a unique display featuring uses of Stauffer chemicals. No tricks, but there's a daily contest. You can win a valuable **ABERCROMBIE & FITCH** merchandise certificate.

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• ELECTRON BEAM FURNACES • HIGH-PURITY REFRACTORY METALS AND ALLOYS • PHOSPHORIC ACID • PHOSPHATES OF AMMONIA • BONE M

GROWTH'S A HABIT

STAUFFER HAS IT!

One of the newest members of the Stauffer family is a plant at Baton Rouge, La., using a highly efficient Stauffer-developed process for the production of liquid sulfur dioxide. The plant has a rated capacity of 10,000 tons a year, but if form counts for anything, production from the new Stauffer plant will exceed rated capacity by at least X% (whatever that means).

Pulp and paper manufacturing, oil and sugar refining and textiles—to mention a few important southern industries— will absorb much of the new plant's production. For information on Stauffer's liquid SO_2, write to Consolidated Chemical Industries Division, Stauffer Chemical Company, 6910 Fannin Street, Houston 25, Texas.

Stauffer CHEMICALS **Details**

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Washington
Newsletter

CHEMICAL WEEK
September 16, 1961

Incentives for private investment in underdeveloped nations are broadened considerably under the foreign aid bill now nearing final action in Congress. President Kennedy is not getting all the new incentives he requested. But he will be in a better position than ever to lure private capital into developing countries with improved government guarantees against political and commercial losses. Most of these countries are in dire need of basic chemical industries on which to build other facets of their economy.

Guarantees against political risks will run to as much as $1 billion in each case. This "insurance" also is broadened to cover losses from revolution or insurrection as well as from war, inconvertibility of currency and expropriation. There still is no protection, however, against arbitrary sanctions imposed by foreign governments.

So-called "all risk" equity and loan insurance will be available to private investors for the first time under the new foreign aid bill. An investment will be insured against loss from any cause—except fraud or misconduct—including loss from normal business risk. There will be a $10-million ceiling on such guarantees for each investment. Coverage will be limited to a maximum of 75% of equity and loans, and all guarantees will be limited to 20 years. Insurance also can be extended to wholly U.S.-owned foreign subsidiaries.

•

Possible side effects of drugs must be clearly stated in all packages beginning next March, says the Food and Drug Administration. An enclosed brochure detailing complete information on the drug must be included in every package of prescription drugs sold to doctors, druggists and hospitals. Under current FDA regulations, drug manufacturers do not have to include such information in a shipment but must include a statement that it is available on request. The new rule is a direct outgrowth of hearings on the subject by Sen. Estes Kefauver's antitrust and monopoly subcommittee.

•

The saline water program has been cut back slightly by Senate-House conferees ironing out differences between versions enacted earlier by the two chambers of Congress. Agreement was reached on a $75-million, six-year research program, middle ground between the Senate's $100-million, 10-year program and the House's $50-million, five-year authorization. Final Congressional approval is assured.

House conferees forced rejection of the controversial section of the Senate bill that would have given the Office of Saline Water a virtually unlimited budget to build demonstration plants capable of producing up to 50 million gal. of fresh water per day. Some demonstration

plants will be built under the research program, but each one will require approval of Congress.

•

A plan to ease the Du Pont stockholders tax burden stemming from forced divestiture of 63 million shares of General Motors stock (*see p. 29*) has passed its first hurdle in Congress. The House Ways & Means Committee approved a bill that would permit Du Pont shareholders to treat their new stock as a capital gain rather than as ordinary income. A provision in the bill would mean that divestiture could take place in less than the 10 years specified by the Supreme Court.

Committee approval of the measure was something of a personal triumph for Du Pont President Crawford Greenewalt, who spent several days on Capitol Hill stirring up interest in the legislation. He argued that the bill would not benefit Du Pont but would help stockholders, and that it would result in no loss of tax revenue. Congressional enactment this year still is doubtful, however. There is considerable opposition to the measure among Senate liberals.

•

Centralized purchase of chemical supplies for the military is under active consideration at the Pentagon. Under the proposal, items used by all the services would be purchased by the new defense supply agency, recently created by Defense Secretary Robert McNamara. The new unit will buy and distribute thousands of commercial-type, common-use items formerly purchased by one or more of the various services. One of its first assignments is to purchase medical supplies for all the services, formerly the task of the Navy. No decision has been made yet on whether similar action will be taken on chemical supplies.

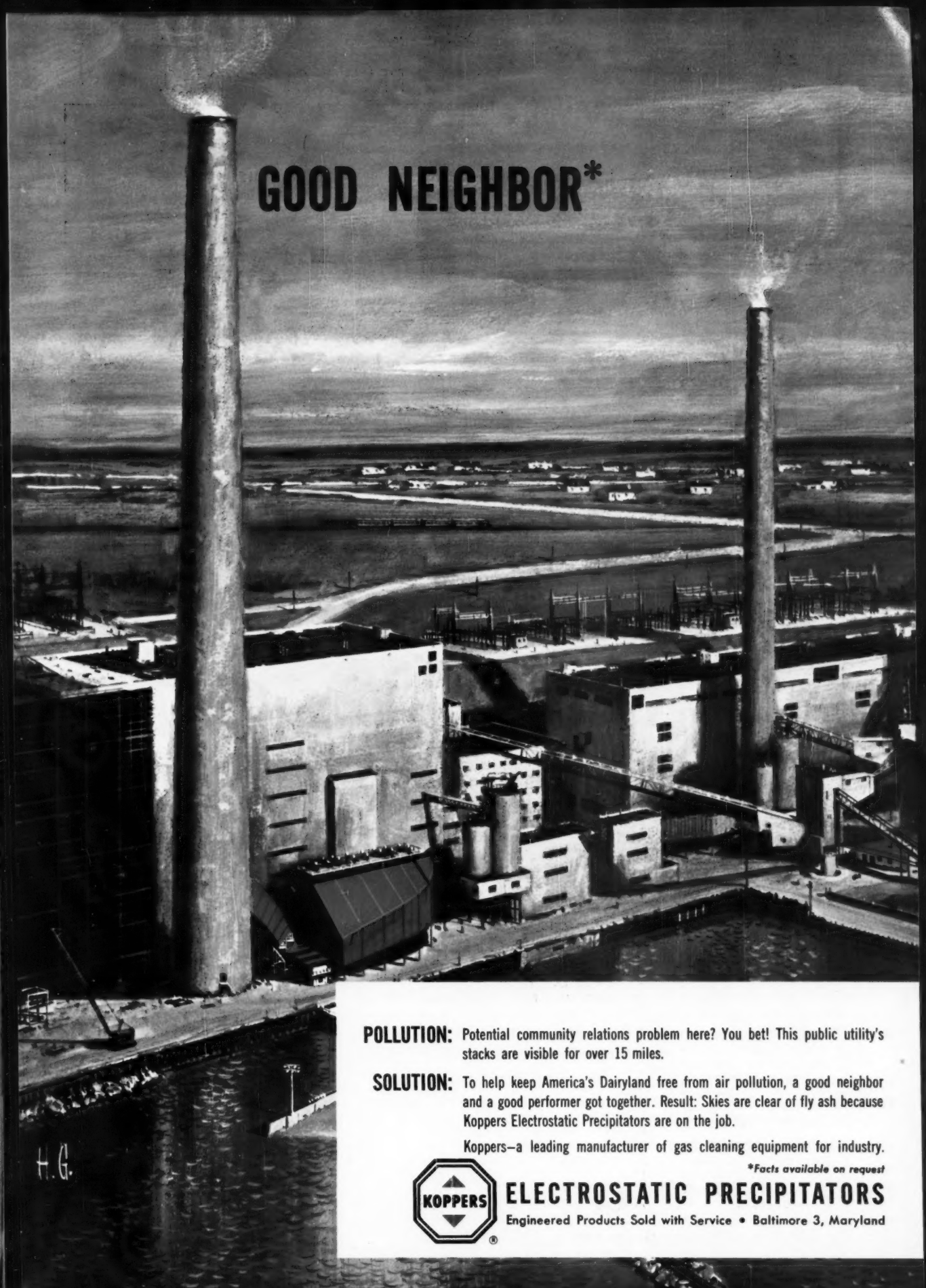
•

The nation's biggest gamma radiation research unit will be in operation by early winter. That is the latest word from the Bureau of Mines, which will operate the Albany, Ore., facility to study the effects of gamma radiation on crude oil, coal and coal products, and a wide variety of minerals. The cobalt-60 source will have a strength of 155,000 curie. Goal of the research: to determine both destructive and beneficial chemical reactions.

The program will be pursued with the cooperation of the Atomic Energy Commission and private industry. Officials say special care will be taken to avoid duplication of work undertaken by industry.

•

Authority to sell 155.6 million lbs. of castor oil from the strategic stockpile is being sought by the General Services Administration. World production of castor oil averages only about 500 million lbs./-year. If Congress authorizes the disposal, GSA will start selling the castor oil after a six-month waiting period. Castor oil now is used chiefly as a fine lubricant in jet and turbine engines and as a component in certain chemical manufacturing processes.



POLLUTION: Potential community relations problem here? You bet! This public utility's stacks are visible for over 15 miles.

SOLUTION: To help keep America's Dairyland free from air pollution, a good neighbor and a good performer got together. Result: Skies are clear of fly ash because Koppers Electrostatic Precipitators are on the job.

Koppers—a leading manufacturer of gas cleaning equipment for industry.

**Facts available on request*

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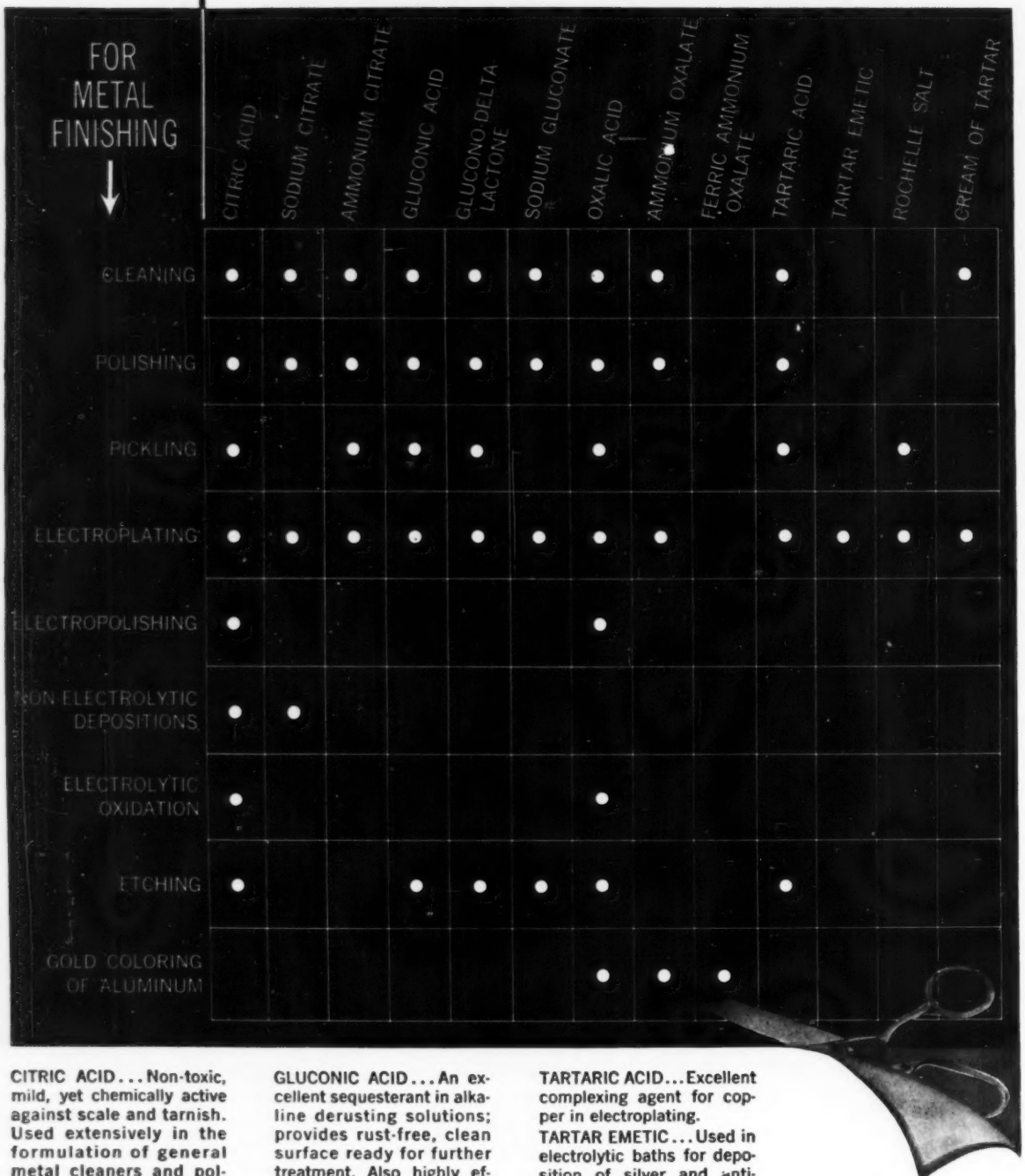

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CREAM OF TARTAR... An excellent additive for brass and aluminum cleaning compounds. Its crystalline structure acts as an effective abrasive in paste polishes. Chemically active against tarnish.

For further details write to Chas. Pfizer & Co., Inc., Chemical Division, Brooklyn 6, New York.

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CHEMICAL DIVISION

Packets and pellets are new approaches to home laundry market.

New Shapes for Syndets

U.S. housewives are currently snapping up laundry detergents in premeasured form — tablets or in water-soluble plastic envelopes — at a pace that has already jolted the $1-billion/year laundry detergent field, though most products so packaged are hardly out of the test-market stage.

All three of the soapmaking giants — Procter & Gamble, Lever Brothers, Colgate — as well as many of the smaller companies have launched premeasured syndets. In virtually every region of the nation, at least one is on sales trial.

The most recent market entries: Quick-Solv, a tablet detergent Colgate has just put into test markets in Denver and Oklahoma City, and "answer," a dissolving-package detergent that Tidy House Corp. (Shenandoah, Ia.), division of Pillsbury Co., has introduced in Lincoln, Neb., test markets.

Quick-Solv is Colgate's second tablet item (it also has Ad Tab detergent tablets). The new product is retailed in three sizes of packages — regular (12 tablets), giant (24) and jumbo (48), which sell for 43¢, 83¢ and $1.60, respectively. The "answer" dissolvable packets—10 in a box selling for 98¢ — contain detergent, dry bleach (probably nonchlorine type), water softener and deodorizer.

In recent months, Lever Brothers, second-largest seller of soap and detergents in the U.S., put its third entry into the premeasured detergent market. Called Hum, and also a heavy-duty, low sudser, it is a soluble-packet item sold in boxes of 10 (39¢), 20 (74¢) or 60 envelopes ($2.24). Hum made its debut in Jacksonville, Fla., and Harrisburg, Pa., marketing centers shortly after Lever had introduced Handy Pack "all" into Ft. Wayne, Ind., and Toledo, O., test markets. All is Lever's best-known heavy-duty, low-sudsing product; the test form is the dissolving envelope — 18 are sold for 71¢, 40 for $1.50.

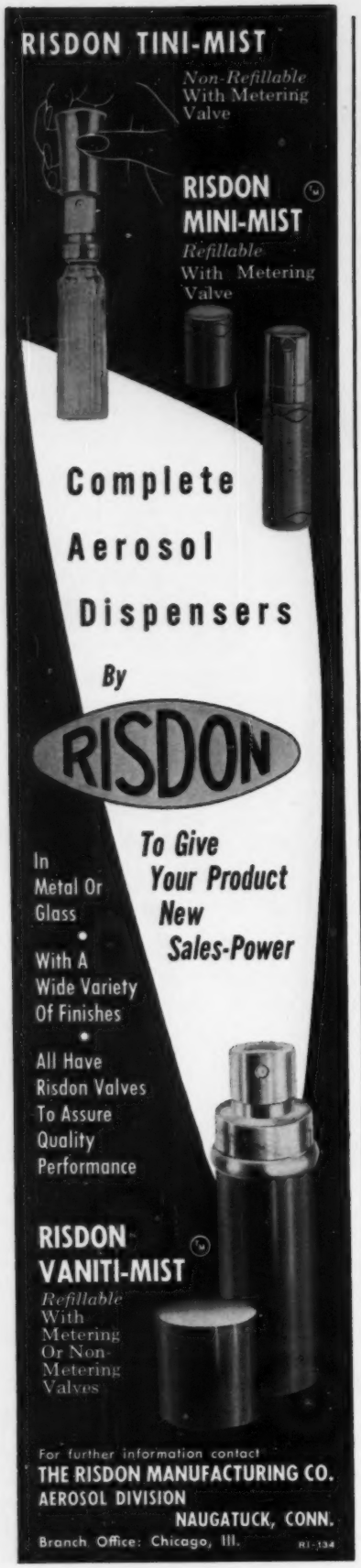
Lever's other premeasured syndet is a tablet form of Vim, which was brought out in '60. It's also a heavy-duty, low-sudser; 24-, 40-, 128-tablet boxes are now in about eight test markets. (About four tablets are used for a load in a 12-18-gal. washing machine.) Lever now matches P&G's score of two dissolvable-packet products and one tablet product in the test stage.

Lever's over-all U.S. consumer cleaning agents line (not including the new products) now consists of: Rinso, "all", Silver Dust, Breeze, Surf, Liquid "all", and Wisk (the latter two are liquids) in the laundry detergent line. Its light-duty liquids are Swan Liquid and Liquid Lux; its all-purpose liquids are Handy Andy and the ammoniated Reward. In bar soaps, Lever has Praise, Dove, Lux, Lifebuoy and Swan. The company also markets Nifty, a recently introduced liquid scouring compound, and Dishwasher "all". These account for an estimated 20% of the U.S. consumer dollars spent for cleaning agents.

Opening Salvo: Procter & Gamble began its incursions into the premeasured detergent field when it brought out the tablet Salvo early in '60. It is now sold in three sizes (23 oz. at 47¢, 46 oz. at 89¢, 138 oz. at $2.59). Since the launching of Salvo the company has introduced two dissolvable-package products. The first was Tide Redi-Paks. These are now in fairly wide distribution throughout the country—so wide that Redi-Paks can really be considered out of test marketing. Where both Tide Redi-Paks and Salvo tablets are sold, trade sources say, Tide seems to be the favored item. P&G's second item, introduced just recently, is Dash Redi-Paks, a low-sudser that's being test marketed in St. Louis and Denver.

P&G is generally credited with more than 50% of the consumer soap and detergent business. Its product line-up is especially impressive in packaged laundry soaps and detergents. These include Tide (the nation's top seller), Cheer (the second-biggest seller), Dash, Premium, Duz, Dreft, Oxydol, American Family, Ivory Snow and Flakes. In light-duty detergents it has Joy and Liquid Ivory (the top seller). Mr. Clean is its all-purpose liquid entry (and top seller) and Spic and Span is its all-purpose powder. In the bar soap field it has Zest, Lava, Camay and Ivory. Its cleanser is top-selling Comet, and Cascade is its liquid dishwashing compound.

Colgate's Pair: Besides the Quick-Solv tablet being test marketed in the West, Colgate-Palmolive has a dissolvable-package detergent called Swerl, which is offered in three sizes:



12 packets (39¢), 24 packets (75¢), 48 packets ($1.49). There's some trade talk that Ad may come out in a premeasured, soluble-package form. Ad Tabs (tablets) are being test marketed in the Portland, Ore., area.

The C-P consumer line up of soaps and detergents (C-P is believed to account for 10% of this market) consists of Fab, Vel, Ad, Super Suds and Dynamo (a liquid) in the laundry field. Its light-duty liquid is called Vel; its bar soaps consist of Choice, Palmolive, Cashmere Bouquet and Octagon; and its scouring cleanser is the No. 2 seller, Ajax.

Local Angle: Among the smaller soapers, two West Coast-based companies, Purex (South Gate, Calif.) and Los Angeles Soap Co. (Los Angeles) have displayed an interest in premeasured soaps.

Purex—which last year bought from Techno-Economic Services the trademark Toss, the label put on the first detergent to use the dissolving-bag trick — still hasn't settled on its approach to packaging. It has sampled a pellet-form product in a few stores. The soluble-bag idea stands high in its current plans, however, and it appears likely that it will make a sales push for such a product before the year is out.

At Los Angeles Soap the picture is pretty much the same. The company has products both in tablet and dissolvable-package form in the lab, could bring either on the market. Among the products being lab tested now is the company's regular White King Detergent, in both tablet and soluble-package form. The company also has some new formulations designed to match new trends in washing machines: shorter wash cycles, dispensers, etc. These products are considered a fair distance away from the market, however.

Lestoil Leaning? The course of one of the newest major factors in laundry product selling — that of Lestoil Products, Inc.* (Holyoke, Mass.) — is still a question mark. Lestoil helped sell the idea of soluble packages with its highly successful Lestare, and it is said to be looking at the soluble package for detergents as well.

And Fels & Co. (Philadelphia) has taken the step of test selling a pellet form of its Instant Fels Naptha. Fels favors tablets over soluble packages because of lower cost. While a granular product costs 4¢/wash, tablets cost 6¢ and packages 9¢.

The half-dozen products in soluble packages and the four tablet products offer the housewife a new approach to her washday chores—but at a slight cost premium. Few companies, however, have gone wrong in overestimating the price the housewife is willing to pay to ease her household toil. At least some of the premeasured products in test markets should survive the rigors of full-scale marketing. In any case, the number of companies moving into the market indicates the industry's willingness to move fast in any direction that promises a sales bonanza.

* Affiliate of Standard International Corp. (Andover, Mass.).

Future in Foods

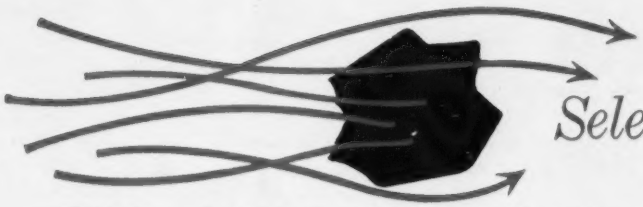
The Northern Utilization Research and Development Division, Agricultural Research Service, U. S. Dept. of Agriculture — better known as the Northern Regional Laboratory — at Peoria, Ill., has come up with what it believes to be the first isolated vegetable protein that forms a heat-reversible gel.

The material is expected to have wide application in food processing, and many large food companies are said to be showing much interest.

The product is a soybean protein that is isolated by a simple process: an aqueous extract of defatted soybean meal, upon acidification, yields a phospholipid material along with the protein. The protein can be easily separated from this unwanted impurity by washing with various aqueous alcohols. The concentration of alcohol used to wash the acid-precipitated protein has a great effect on the amount of material removed and the nitrogen content of the extracted protein.

Optimum extraction is accomplished by washing with 95% (volume) methanol 86% ethanol or 82% isopropanol. After alcohol extraction, the protein is washed and dried with ethanol, then dispersed in a dilute solution of sodium hydroxide, clarified and finally freeze-dried.

The product dissolves readily in water at room temperatures. It forms firm gels with water at 8-10% concentrations, and can also produce extremely stable, low-density foams and



Selective adsorption...

THE CASE FOR DAVISON SILICA GEL

It's probably a familiar fact to you that Silica Gel is not a "gel" at all, in the usual sense of the word, but a hard tough semi-transparent solid, completely honeycombed with inter-connecting pores of submicron size. This structure provides a tremendous internal surface area accessible to molecules diffusing through the pores.

Consider: One cubic inch of Davison Silica Gel has an adsorptive surface of 90,000 square feet—an area larger than two city blocks. The Silica Gel produced for gas dehydration and hydrocarbon recovery is a typical example. It has an internal surface area of over 800 square meters per gram of desiccant and a total pore volume of .43 cc per gram.

This great adsorptive capacity is what makes Davison Silica Gel a favored desiccant for air and gas dehydration. But today, dehydration of itself is only half the story. These days, Silica Gel is getting more immediate attention because of its *selective* adsorption ability.

What is "Selective Adsorption"?

Every material has some ability to adsorb vapors, but such ability is strictly a matter of degree. Silica Gel, on the other hand, is outstanding in its ability to carry out adsorption *selectively,* while holding a larger quantity of adsorbate per unit area than most other materials. Through the development of specific processes, Davison can manufacture a variety of Silica Gels which can preferentially adsorb one substance over another. Through the years, production reliability has improved to the point where the number of grades of Silica Gel provide a choice for almost every need.

Today, Davison produces some 30 different grades of Silica Gel for an increasing variety of uses. To name a few: *natural gas drying; hydrocarbon recovery; chromatography; catalyst support;* recovery of distillate from natural and separator gases; *drying liquid petroleum gas; drying air in wind tunnels;* keeping precision electronic instruments dry; many forms of packaging where air drying is essential to prevent rust; corrosion, mildew; *refrigeration systems; equipment storage, underground gas storage* and *drying of annealing* ovens and blast furnace gases.

Why Should YOU Consider Davison Silica Gel?

If the above isn't enough to whet your appetite for further data, consider Davison Silica Gel's extremely high purity . . . its higher resistance to fouling and contamination . . . its lower regeneration cost . . . its longer operating cycles in dynamic drying systems.

As America's leading supplier of this selective adsorbent, Davison is ready to apply its knowledge and experience toward helping you exploit the valuable properties of Silica Gel for your own product and profit advantages. In addition, we're deservedly proud of our ability to deliver on time, per your order. Write us today, attention Dept. 3504, or call us any time for technical assistance.

GRACE

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There's a lot more to the Davison Silica Gel story. Write us today. Find out how we can help you.

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Please send information and facts about the use of Davison Silica Gel.

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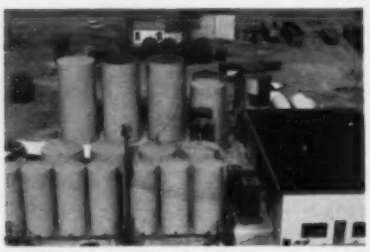

Completed on turnkey basis. First high-capacity liquid fertilizer plant in the world designed around use of 54% P_2O_5 wet process Phosphoric Acid. Capacity: 25 tons per hour.

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whips (similar to egg-white or similar commercial whips) USDA says.

Prime advantage held by the new protein, according to USDA: when used in food products, it requires no approval for use from the Food & Drug Administration. It has considerable food value and appears to have significant potential in quickly prepared, high-protein specialty foods.

The extraction of the protein was worked out by A. C. Eldridge, W. J. Wolf, A. M. Nash and A. K. Smith.

MEETINGS

The fourth annual conference of the Canadian Manufacturers of Chemical Specialties Assn. will be held Oct. 30-Nov. 1 at Royal York Hotel, Toronto. Theme: "Canada and the Industry Developing Together." All specialties firms, members of CMCS or not, are invited; premeeting registration cost is $45 for CMCS member company delegates; $55 for nonmembers. Fee covers business sessions, two luncheons, cocktail party and banquet. The association is headquartered at 3405 Cote des Neiges Rd., Montreal, Que.

PRODUCTS

Adds Anionics: Armour Industrial Chemical Co. (Chicago) has developed two new anionic surface-active agents, Armosul 16 (based on α-sulfopalmitic acid) and Armosul 18 (α-sulfosteric acid). Both are difunctional compounds having a strongly acidic, sulfonic acid group and a weakly acidic, carboxylic group within the molecule. A blend of one of these products and sulfated alcohols, substituted for some of the alkyl aryl sulfonate in detergent formulations, is said to give improved cleaning power. Salts of the Armosul acids can also be used as the main ingredients for detergent bars.

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Antiflame Latex: National Starch and Chemical Corp. (New York) has begun marketing a new fire-retardant paint latex (developed by Dow Chemical) under the name Resyn 1066.

•

Quats: A new series of germicidal and algaecidal products, tradenamed Emkasans, is now being offered by Emkay Chemical Co. (319 Second St., Elizabeth, N.J.). Emkasan QA-50, first of the new series is a cationic surface-active quaternary ammonium compound based on dodecylbenzyl trimethylammonium chloride.

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High-Density Trio: Commercial quantities of three new types of high-density polyethylene resins are being offered by Hercules Powder Co. The new resins, priced at 32¢/lb. (carload lots) are in the 0.962 density range. They are called Hi-fax 2000, 2100 and 2200 and are intended for such applications as film and paper coating, and large-shot injection molding.

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Thicker Emulsion: Valchem Chemical Division of United Merchants & Manufacturers (1407 Broadway, New York) is offering a polyethylene emulsion of high concentration for textile finishes, paper coatings and polishes. The product, Valsof PE-45, has a total solids content of 45%, polyethylene solids content of 35%. It is produced at the company's Langley, S.C., plant.

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Cadmium Dip: A liquid one-dip finish for cadmium, said to be easily rinsed and resistant to clouding or staining is being marketed by Allied Research Products (4004 East Monument St., Baltimore, Md.) under the name Iridite 4L-1.

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Foil Coating: Borden Chemical Co. (New York) has developed a new overprint lacquer coating for aluminum foil, paper and Glassine, called SO-785. It's said to provide a tough, high-gloss, clear film, is applied by flexographic press equipment. Drying takes places in 3-4 seconds at 280 F. Solids content: 20.5 to 22.5%.

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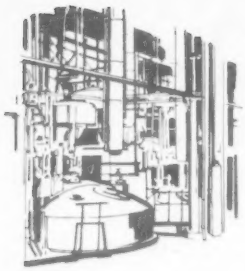
Modified Polypropylene: AviSun Corp. (Philadelphia) is offering a modified (filled) polypropylene that it says shows promise where high rigidity, heat and creep resistance are important. The material (price: 36¢/lb.) is aimed at electrical and electronic component applications.

•

Tablets for Teeth: Ora-Dent Corp. (844 West Lodi Ave., Lodi, Calif.) has begun national distribution of Foam-Ettes, a dentifrice requiring no brushing. The product—a single-use, foaming tablet containing calcium dibasic phosphate, sodium



Rohm & Haas' broad line of plasticizers for vinyls ranges from monomeric esters (MONOPLEX series) to complex high molecular weight polymers (PARAPLEX series). In addition, Rohm & Haas offers three ACRYLOID resins (acrylic polymers) which are designed to improve the performance properties of rigid and semi-rigid vinyls —particularly processing characteristics and impact strength.

If you process vinyls, here's what you should know about these plasticizers and modifiers.

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PLASTICIZERS & MODIFIERS

for vinyl and related polymers

PLASTICIZER PERFORMANCE PROPERTIES IN EQUAL HARDNESS FORMULATIONS

PLASTICIZER GRADE	% Plasticizer to give 10 sec. Shore A Hardness of 77	PERCENT EXTRACTION LOSS BY:				Low Temperature Flexibility,[2] $T_{135,000}$, °C.
		Activated Carbon Volatility,[1] 24 Hrs., 90°C.	Oil Extraction,[1] 10 Days, 25°C.	Hexane Extraction,[1] 2 Hrs., 25°C.	1% Soap Extraction,[1] 24 Hrs., 90°C.	
PARAPLEX G-25	40.5	0.6	+0.2	0.9	0.3	−11.5
PARAPLEX G-40	45	0.7	0.2	0.3	12.0	−13
PARAPLEX G-41	42	0.5	0	0.3	2.3	−11.5
PARAPLEX G-50	39.5	1.1	3.0	3.6	8.4	−15
PARAPLEX G-53	40	0.8	1.5	1.7	3.3	−12
PARAPLEX G-54	39	0.7	2.1	2.3	2.6	−13
PARAPLEX G-60	37	0.8	4.8	12.1	1.0	−18
PARAPLEX G-61	37	0.7	4.4	11.5	0.5	−17.5
PARAPLEX G-62	36.5	0.6	3.9	10.8	0.2	−16.5
MONOPLEX S-38	35.5	2.0	2.7	11.5	17.8	−11.5
MONOPLEX S-70	34	8.4	20.5	23.3	8.4	−48.5
MONOPLEX S-73	34	2.5	18.0	22.6	9.4	−41.5
MONOPLEX S-90E	40	0.9	2.7	27.7	0.6	−14.5
MONOPLEX DCP (Dicapryl Phthalate)	36	7.6	16.1	24.6	8.2	−25.5
MONOPLEX DOS (Dioctyl Sebacate)	35	4.1	15.9	28.0	1.0	−56
Dioctyl Phthalate[3]	35	7.6	7.7	21.8	7.8	−25

[1] Based on 10 mil thick film specimens.
[2] Clash-Berg method using 70 mil molded slab.
[3] Not offered—included for comparison only.

PARAPLEX
polymeric plasticizers

PARAPLEX G-25

- **exceptional permanence**
- **excellent compatibility**
- **high resistance to ultra-violet light**

Paraplex G-25 is a high molecular weight plasticizer which imparts exceptional permanence. Properly stabilized vinyl compounds which contain Paraplex G-25 plasticizer are outstanding in durability. Paraplex G-25 has excellent resistance to extraction by gasoline, oil, water, soap and detergents, as well as freedom from migration in contact with lacquer, alkyd and varnish finishes. Compatibility with vinyl resins is excellent. Original physical properties are retained even after prolonged service at elevated temperatures.

Typical uses include: high grade upholstery sheeting and coated fabric, refrigerator gaskets, surgical tapes, insulation resistant to high temperature, coaxial cable, window channeling, electrical tapes.

PARAPLEX G-40

- **high resistance to migration into rubber**
- **high resistance to extraction by oil**
- **light color**

Paraplex G-40 is a high molecular weight polyester plasticizer which combines permanence of plasticizing action with moderate cost. In vinyl compounds, Paraplex G-40 shows high resistance to migration into rubber and rubber-based materials, high resistance to extraction by aliphatic and aromatic hydrocarbons, and low losses due to volatility.

Typical uses include: industrial hose and tubing, industrial and domestic flooring, shoe liners and counters, electrical tapes and industrial aprons.

PARAPLEX G-41

- **exceptionally light color**

In resistance to extraction by hydrocarbons and to migration into rubber, Paraplex G-41 is on an equal footing with Paraplex G-40. However, Paraplex G-41 is superior in compatibility at high plasticizer levels and after long exposure to humid conditions, in plasticizing efficiency, ease of processing, low-temperature properties, and resistance to extraction by soapy water.

PARAPLEX G-50

- **good processing characteristics**
- **very good over-all permanence**

Paraplex G-50 is a general-purpose polymeric plasticizer similar to monomeric plasticizers in its handling and processing characteristics. It is notably superior to dioctyl phthalate in resistance to extraction by oils and hydrocarbons, freedom from volatility, and resistance to migration into lacquers, rubber, and typical baked finishes. Vinyl compounds containing Paraplex G-50 are very stable, as evidenced by the retention of original properties after prolonged aging at high temperatures.

Typical uses include: insulation resistant to high temperature, upholstery sheeting, coated fabric, flooring, refrigerator gaskets, window channeling, surgical tapes, electrical tapes, shoe liners and counters, pigment dispersion vehicles, doll compounds.

MONOPLEX DOS

(dioctyl sebacate)

- **outstanding performance at low temperatures**
- **low volatility**
- **resistance to extraction by soap and detergent solutions**

Monoplex DOS is an ester-type plasticizer widely used as a standard in vinyl compounds requiring flexibility at low temperature. It also provides low volatility, high plasticizing efficiency and excellent resistance to extraction by water, soaps and detergents. Like other plasticizers which impart low temperature flexibility, Monoplex DOS is susceptible to extraction by hydrocarbons and deficient on migration resistance. It is a very effective plasticizer for organosol and plastisol compounds.

Typical uses include: primary electrical compounds, sheeting and film for use at low temperatures, jacket compounds, strip-coating compounds.

MONOPLEX S-38

- **excellent compatibility**
- **good permanence at low cost**

Monoplex S-38 is a low-cost primary vinyl plasticizer particularly noted for its good permanence properties. It is high in molecular weight and offers definite advantages over dioctyl phthalate. Monoplex S-38 is lower in volatility and better in resistance to extraction by oil and gasoline. Compounds exhibit excellent freedom from tack and exudation. Monoplex S-38 also proves helpful in improving the compatibility of secondary plasticizers.

Typical uses include: low-cost sheeting, flooring, automotive harness tapes, low-cost gasketing, electrical jacketing stocks.

MONOPLEX S-70

- **stabilization against effects of heat and light**
- **good performance at low temperatures**

Monoplex S-70 is designed specifically to impart flexibility at low temperature. It is a very efficient plasticizer with good processing properties and a marked stabilizing effect. It has lower volatility than conventional plasticizers for low temperature applications. The stability imparted by Monoplex S-70 not only permits fast, high-temperature compounding, but also affords savings in stabilizer costs. Organosols and plastisols prepared with Monoplex S-70 are of low viscosity and have excellent viscosity stability.

Typical uses include: garden hose, film and sheeting for use at low temperatures, slush-molding compounds, electrical jacket stocks, automotive insulation.

PARAPLEX G-54

- very light color
- low taste and odor
- very good compatibility at high humidity and elevated temperatures
- high resistance to extraction by soapy water and oil
- excellent resistance to marring of polystyrene and baked enamels

Paraplex G-54 was especially designed to provide freedom from exudation on exposure to high humidity at elevated temperatures. Other noteworthy properties which this plasticizer imparts include resistance to marring of polystyrene, lacquers, and baked enamels; good resilience; outstanding plasticizer efficiency; good electrical properties; resistance to copper corrosion; and resistance to extraction by soapy water, oils, and gasoline. The properties of Paraplex G-54 make it particularly well suited for many applications which require resistance to both aqueous and organic solvents.

Typical uses include: high-temperature electrical insulation, refrigerator gaskets, electrical and surgical tapes, babywear film, hospital sheeting, and upholstery (household and automotive).

PARAPLEX G-60

- excellent resistance to extraction by soap and detergent solutions
- stabilization against heat
- accepted by F. D. A. for food packaging

Paraplex G-60 is a light-colored, high molecular weight, ester-type plasticizer which provides effective heat and light stabilization in vinyl chloride polymers, nitrocellulose lacquers, and chlorinated rubber compounds. It imparts good flexibility at low temperature, excellent soap and detergent resistance, and low volatility loss. Paraplex G-60 lowers stabilization costs of vinyl compounds and permits high temperature processing.

Typical uses include: general-purpose film, babywear, food packaging and tubing, upholstery sheeting, coated fabric, glove-dipping compounds, flooring.

PARAPLEX G-61

This plasticizer is generally similar in properties and uses to Paraplex G-60. It is superior in retention of compatibility on long term exposure, has better stability against light, and is more resistant to extraction by oil.

PARAPLEX G-62

- excellent stabilization against effects of heat and light
- good general permanence properties
- good resistance to soap and detergent solutions
- low taste and odor
- accepted by F. D. A. for food packaging

Paraplex G-62 is a high molecular weight plasticizer which combines good permanence properties with excellent stabilization against heat and light. It has low volatility, good resistance to extraction by soap and detergent solutions, and high compatibility over a wide range of concentrations and conditions. Permits fast calendering and low stabilization costs, provides uniform color and excellent resistance to embrittlement and discoloration.

Typical uses include: general-purpose film, upholstery sheeting, coated fabric, refrigerator gasket stocks, garden hose, doll compounds, food packaging and tubing, welting, primary insulation, jacket stocks, flooring, insulation resistant to high temperature, window channeling.

MONOPLEX
monomeric plasticizers

MONOPLEX S-73

- excellent low-temperature flexibility
- stabilization against effects of heat and light
- unusually good permanence at moderate cost

Monoplex S-73 couples excellent low-temperature flexibility with good compatibility and low volatility, and thus offers outstanding performance over a broad temperature range. Its stabilizing effects against degradation by heat and light further extend its fields of use. Relatively low price and low specific gravity result in production economy. This low-viscosity plasticizer is particularly useful in plastisol applications where it imparts exceptional viscosity-stability.

Typical uses include: rear windows for convertible automobiles, transparent automobile seat covers, garden hose, storm-window glazing, slush-molding compounds.

MONOPLEX S-90E

- electrical-grade plasticizer
- excellent high-temperature performance
- retention of resistivity after prolonged water exposure

Because it imparts good retention of physical and electrical properties after heat aging and exposure to water, Monoplex S-90E is an excellent plasticizer for electrical insulation. In addition, this plasticizer provides unusual permanence, resistance to microorganism attack, and freedom from copper corrosion. Its low viscosity and ease of incorporation also make it useful in non-electrical applications. In dispersion compounding, it gives low-viscosity plastisols with very good viscosity-stability.

Typical uses include: high-temperature electrical insulation, dispersion compounding, tapes, gaskets, and coatings for awnings and truck tarpaulins.

MONOPLEX DCP

(dicapryl phthalate)

- general-purpose plasticizer

Monoplex DCP is a general-purpose monomeric plasticizer having performance characteristics, in vinyl resins, virtually identical to those of dioctyl phthalate. While it shows less resistance to extraction by oil and gasoline and lower plasticizing efficiency, Monoplex DCP withstands degradation by heat, light and outdoor exposure slightly better than dioctyl phthalate. In plastisol and organosol compounding, Monoplex DCP provides low viscosity, both initially and upon aging.

Typical uses include: general-purpose replacement for dioctyl phthalate.

ACRYLIC MODIFIERS FOR POLYVINYL CHLORIDE

Low cost, ready availability, chemical inertness, high abrasion resistance, and good electrical properties make rigid polyvinyl chloride a very useful material for fabricating a wide variety of extruded, calendered, and vacuum-formed plastic products. However, the unmodified resin has two rather serious shortcomings which restrict its usefulness — poor processing characteristics and low impact strength. These limitations are particularly true for the high-molecular-weight resins which are lower in cost, have better heat and light stability, better chemical resistance, and higher heat-distortion temperatures than their lower molecular weight and copolymer counterparts.

Rohm & Haas offers two acrylic resins, Acryloid K-120N and Acryloid KM-228, which eliminate some of the objectionable features of rigid PVC. In particular, these modifiers make possible the use of the low-cost, high-molecular-weight polymers of polyvinyl chloride in applications which were heretofore not practical. A third modifier, Acryloid KM-220, is very useful in semi-rigid compounds.

ACRYLOID K-120N

imparts to rigid vinyls:

- **improved processing characteristics**
- **better heat and light durability**
- **higher heat-deformation temperature**

Processing improvements with Acryloid K-120N begin right on the mill, where a smooth bank and faster mixing are perceptible. Further benefits are: (a) *Calendering* — faster machine speeds, better roll release, freedom from roll plating, and improved gloss, (b) *Extrusion* — better surface qualities, freedom from plating, and increased heat stability, (c) *Vacuum forming*— improved flow of the hot sheet as it is drawn into the mold. In most operations, lower processing temperatures are permitted. Also, time required to rework scrap is cut to a minimum.

ACRYLOID KM-228

gives rigid vinyls:

- **very high impact strength**
- **improved processing characteristics**
- **retention of impact strength even after considerable overmilling and reworking**

Acryloid KM-228 improves substantially the impact strength of rigid vinyl homopolymers and copolymers. An appreciable improvement is noticed even at low Acryloid KM-228 concentrations. Acryloid KM-228 modified stocks show remarkable retention of impact properties after prolonged heat exposure; this means a reduced amount of rejects and safe reworking of scrap. Retention of impact strength after exposure to ultraviolet light is also exceptional. Acryloid KM-228 is also an excellent modifier for PVC compounds containing low levels of plasticizer. Here, its most valuable contributions are improved processing characteristics and better low-temperature impact strength.

ACRYLOID KM-220

in semi-rigid formulations, confers:

- **good low-temperature flexibility, without softness at room temperature**
- **better processing characteristics**
- **good heat stability**

When compounds with low plasticizer levels are modified with Acryloid KM-220, they show improved low-temperature flexibility and low-temperature impact strength, and yet, they do not manifest undue softness at room temperature. Acryloid KM-220 also provides substantial improvement in milling, processing, and handling properties. In rigid vinyls, Acryloid KM-220 may be used to increase impact strength.

Typical uses for Acryloid K-120N and Acryloid KM-228 include: vinyl pipe, window frames and tracks, sliding door channels, moldings, rain gutters and spouts, automotive trim, packaging, signs and displays, chemical-resistant sheeting, contour maps, refrigerator linings, luggage, safety helmets, light diffusers, ductwork, and machine parts; trim for cameras, air conditioners, refrigerators, radios, and electrical appliances; wall paneling and covering for homes, trains, buses, and airplanes.

Typical uses for Acryloid KM-220 include: automobile crash-pad covers, films for packaging, injection-molded electrical fittings such as plugs for electrical cords.

ROHM & HAAS

PHILADELPHIA 5, PA.

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RPR 61-5

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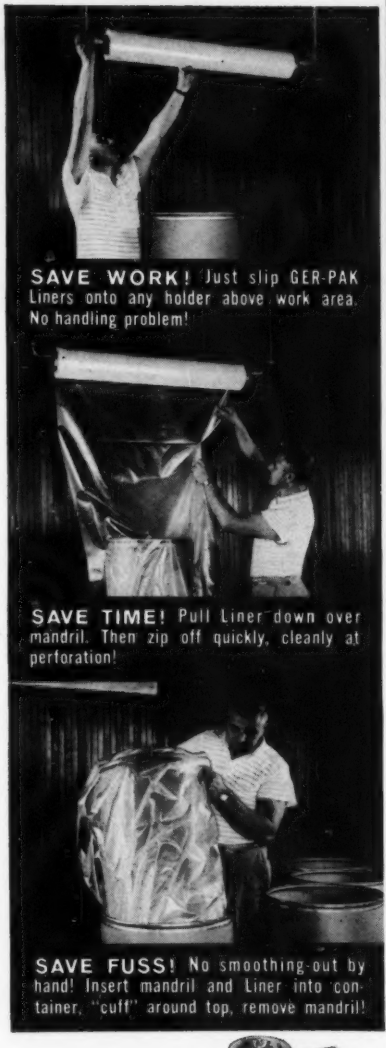

SAVE WORK! Just slip GER-PAK Liners onto any holder above work area. No handling problem!

SAVE TIME! Pull Liner down over mandril. Then zip off quickly, cleanly at perforation!

SAVE FUSS! No smoothing-out by hand! Insert mandril and Liner into container, "cuff" around top, remove mandril!

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For cartons
For cans, pails

- Seals out moisture and all foreign matter!
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- Up to 120 inches in width; no limit to length!
- Available gusseted and non-gusseted!
- Tie-off or peel-over construction!
- LEAKPROOF DOUBLE SEAL optional upon request!

Write Dept. CL1 for samples
the short way to say superior polyethylene sheeting

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lauryl sulfate, carboxymethylcellulose and other dentifrice ingredients—is simply swirled about in the mouth. It will be made by Foam-Ettes, Inc. (San Jose, Calif.), and distributed by Ora-Dent.

•

Epoxy Windup: Two new epoxy resins for filament winding systems have been developed by Union Carbide Plastics (New York). Erl-2256 has a viscosity range of 500-900 cps. at room temperature, is suggested for both wet lay-up and bag molding. Erl-2258, has a range of 100-500 cps. at 25 C., is intended for filament winders requiring extremely low viscosity. Both cure well with anhydrides and aromatic amines at room temperature; both can be used for laminating applications.

•

Epoxy Terrazzo: Co-Polymer Chemicals, Inc. (12350 Merriman Rd., Livonia, Mich.), is offering Poly-Traz, an epoxy resin "terrazzo" aimed at the market held by cement terrazzo flooring. The company offers the resin now, plans later to fabricate it into wall panels (a ground and polished, 3/16-in. Poly-Traz facing cast on 1/8-in. asbestos composition board) for walls or table tops.

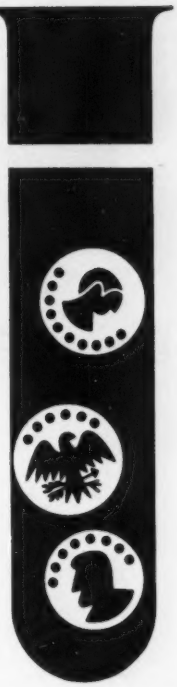
•

Polish Monomer: Union Carbide Chemicals (New York) has begun marketing commercial quantities of a new acrylate monomer for emulsion polymer formulations used in cleanser-resistant floor polishes. The monomer, diethylaminoethyl acrylate, gets its alkali-resistant properties from its amino group. Formulations made with the new material are impervious to alkaline cleaning materials, but sensitive enough to acid to permit easy removal by mildly acidic stripping materials.

•

Plastic Die Cast: American-Marietta's Adhesive, Resin and Chemical Division and Associated Products, an agency of Boeing Co., have entered an agreement by which the former gets exclusive manufacturing and sales rights in the U.S. and Canada to a plastic die-casting material developed by the latter. Not yet named (Chipcore is under consideration) the material is of the metal-epoxy type, is said to have higher heat conductivity than other metal-plastic tools now available.

hidden treasure



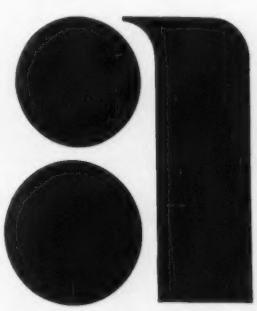
ORTHO-ANISALDEHYDE...which you may also know as O-Methoxy Benzaldehyde... is one of those little-known, little-discussed chemicals which on first look appears to have very limited application. However, its unusually promising physical properties seem to offer exciting possibilities—especially in organic synthesis or as a pharmaceutical intermediate. ANSUL is in a position to supply it in quantities at an extremely reasonable price. We'd like to work with you in developing additional use information. Write us for samples and complete technical information. ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN.

PHYSICAL PROPERTIES

ORTHO-ANISALDEHYDE

MOLECULAR WEIGHT...136.14
BOILING POINT (at 760 mm Hg)...238°C
MELTING POINTS...(1) 38-39°C*
(2) 3°C
SPECIFIC GRAVITY (liquid) 25°/25°...1.1274
SPECIFIC GRAVITY (solid) 25°/25°...1.258
REFRACTIVE INDEX n 20°/D...1.5608
ODOR...Burned, slightly phenolic
SOLUBILITY in H_2O—Slightly soluble
APPEARANCE...White to light tan solid

**Exists in two crystalline forms*



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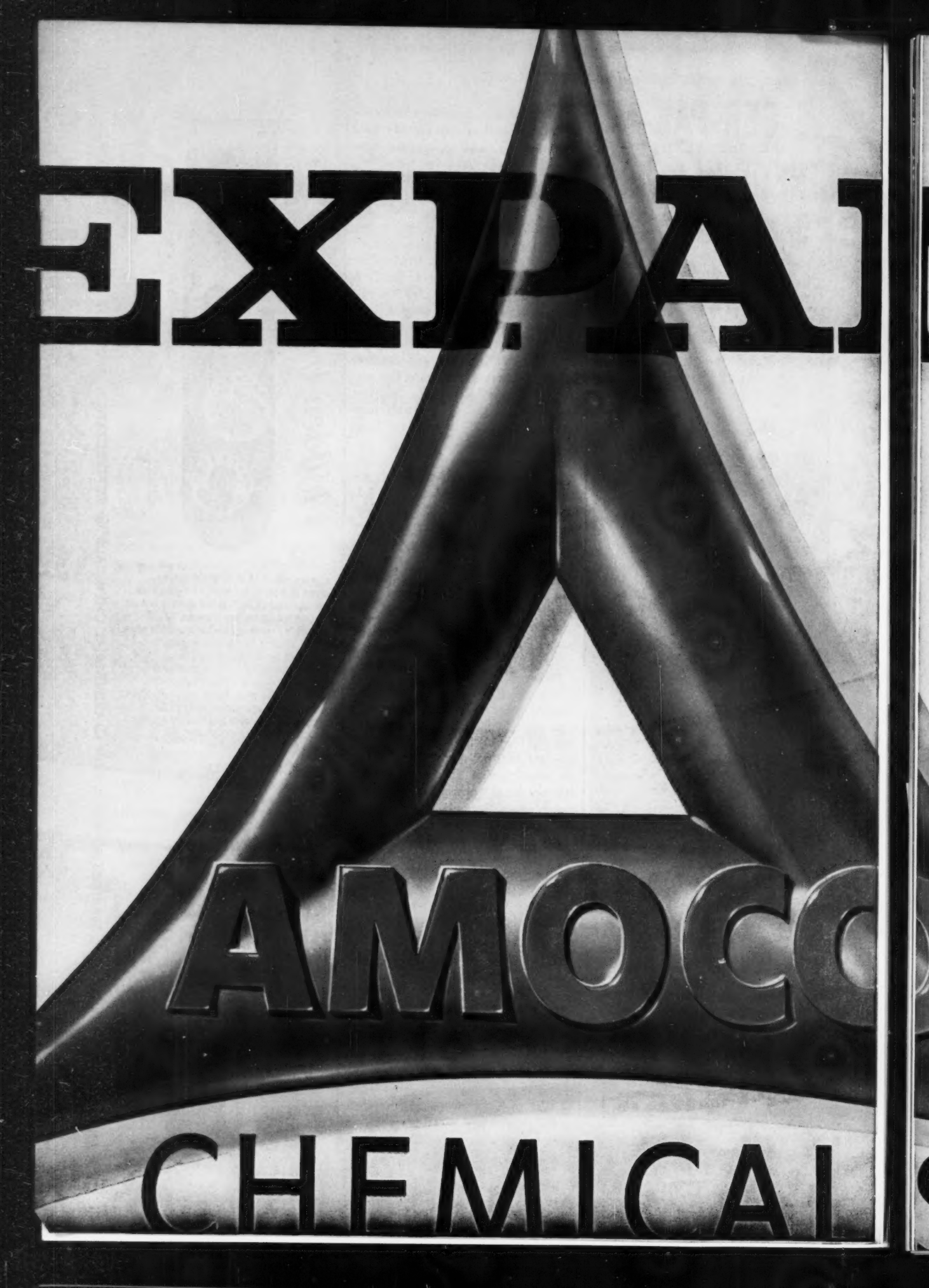
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NSION

Expansion, growth, extending the line, increasing capacity—add them up and they amount to the action we've taken in the last twelve months to offer better service and an increased number of products to our customers both domestically and overseas. Here is a quick summary of the things we've done:

1

Increased INDOPOL Polybutene capacity 60% by expanding existing manufacturing facilities at Wood River, Illinois.

2

In a joint venture, began construction of a multimillion pound a year Oxo Alcohol plant at Haverhill, Ohio.

3

Nearly completed construction of a Trimellitic Anhydride unit at Joliet, Illinois, which will make this intermediate available in quantity for the first time.

4

Stepped up, by 50%, capacity for the manufacture of Dimethyl Terephthalate at Joliet, Illinois.

5

Began construction of new Hydrocarbon Resin manufacturing facilities at Texas City, Texas, which will double capacity.

6

Through an affiliate, joined Algemene Kunstzijde Unie, N.V. in launching construction of a Dimethyl Terephthalate plant at Delfzijl, The Netherlands.

7

Acquired substantial minority holdings in Furukawa Chemical Industries, Company, Ltd., Japan, maker of linear polyethylene.

8

Acquired from our parent company, the chemical research organization of 100 chemists and engineers at Whiting, Indiana, and, in addition, extended customer service laboratory facilities in Chicago.

9

Completed construction and start-up of a petroleum additives plant in Antwerp, Belgium, jointly owned by Amoco Chemicals and Petrofina.

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AMOCO CHEMICALS CORPORATION
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130 East Randolph Drive, Chicago 1, Illinois

AMOCO CHEMICALS

A new process based on continuous autoclaving

This new process, developed and designed by Chemico, assures significant savings in the construction and operation of plants to produce liquid and solid ALUM. Using a horizontal autoclave for the pressure acid digestion of ore, normal three-day processing time is cut to three hours. In addition, the process can utilize a relatively coarse bauxite feed (plus 8 mesh), with further savings in equipment and operating costs. Efficient, compact package plants to produce as little as 3 tons per day of ALUM are available. Other single units to provide up to 120 tons per day can be provided.

ALUM plants now in operation can achieve considerable savings in process time and process costs by changing over to Chemico-designed autoclaves when present batch digestors need replacement.

The new Chemico ALUM process has the following advantages:

- LOWER PLANT INVESTMENT COSTS
- UTILIZATION OF LOWER GRADE ORE
- PROCESS TIME CUT FROM 3 DAYS TO 3 HOURS
- 30% LESS SPACE REQUIRED
- SMALL PACKAGE PLANTS AVAILABLE

Direct all inquiries to CHEMICO, DEPT "A", at the address below.

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Technology
Newsletter

CHEMICAL WEEK
September 16, 1961

How will Nalco Chemical make tetraethyl lead and tetramethyl lead? At its ground-breaking ceremony last week in Freeport, Tex., the firm said that it will use an electrolytic process that "has been under intensive development for a number of years." The plan will occupy about half of a 25-acre site, employ 75-100 people and will be supplied with raw materials mainly from Dow's neighboring plant. Design and engineering is being handled by Fluor Corp.

Nalco has previously stated (*CW, May 6, p. 39*) that its approach differs from Ziegler's TEL process (*CW, June 13, '59, p. 37*). Actually, the foreign patent literature indicates that its method may well involve electrolysis of a Grignard reagent using a sacrificial metal anode.

Nalco's Belgian patent 569,921 cites an example of ethyl magnesium bromide (in ethyl ether) electrolyzed with lead anodes; a reflux condenser returns the ether to the system when it vaporizes; TEL is formed and the lead anode is completely consumed. The firm has improvement patents on the same basic idea. For example, Belgian patent 590,453 deals with feeding in ethyl chloride as well as the Grignard.

•

Watch for word that Cosden is the unidentified licensee of Union Oil's Clathration process (*CW Technology Newsletter, April 22*). Neither Union nor Cosden will say anything, but reportedly Cosden has quietly started up a unit to make 5 million lbs. of *meta*-xylene/year via the Clathration route.

The process separates chemicals according to their molecular configuration. Union did a considerable amount of work on it to produce *para*-xylene. Cosden, however, is more interested in it for *m*-xylene. Normally, the C-8 stream from reforming contains about 20% each of ethylbenzene, *P*- and *ortho*-xylenes; 40% *m*-xylene. In Cosden's fractionation process to pull out ethyl benzene, it's left with a mixed *meta-para* stream. Presumably, this would be sent to the Clathration unit to yield pure *meta* and a 50% *para* stream, which can then be fractionally crystallized to obtain pure *para*.

Cosden does not produce *p*-xylene. However, it operates a *para* unit owned by Phillips at the former's refinery in Big Spring, Tex. Its activity in *m*-xylene traces to a growing interest in isophthalic acid.

•

Elastomers got a big play at American Chemical Society's meeting in Chicago last week (*CW, Sept. 9, p. 38*). U.S. Rubber reported three advances: (1) by supporting a catalyst of aluminum triethyl and vanadium trichloride on clay, the efficiency of isoprene polymerization to *trans*-1,4-polyisoprene (synthetic balata) has been improved 10 times over that obtained with unsupported catalyst; (2) vinyl pyridine rubber, now in development stages, has been srengthened by the addition of inorganic halides; and (3) ethylene-propylene copolymers (*CW, June 10, p. 51*)—

which have generated widespread and strong interest because of their very low raw-material cost—have been synthesized using soluble-catalyst systems of alkyl aluminum halides with vanadium oxytrichloride or tetrachloride.

Esso Research and Engineering Co. and Hercules reported new vulcanizing systems for ethylene-propylene rubber; and Du Pont and Montecatini came in with their EPR advances.

A quick determination of organics in water was described at the ACS meeting by C. J. Crits of Crane Co.'s Cochrane Division (Philadelphia). Procedure: A graduated cylinder is half filled with the sample, shaken vigorously. A ring forms at the surface, travels upwards and disappears. The height of disappearance is an indication of the amount of organics present. (*For more on means of measuring pollutants, see p. 86*).

Stauffer is capitalizing on the interest in vanadium chlorides as a component of a stereospecific catalyst system (*above*). Its Anderson Chemical Division (Weston, Mich.) is producing pilot quantities of both the tetrachloride and the trichloride. The tetrachloride is available as a 95% reddish-brown liquid; the trichloride as a 98% free-flowing purple crystalline powder. In addition to their potential in catalysts, both materials have possibilities as intermediates for making high-purity metals and intermetallics, says Stauffer. The tetrachloride, moreover, is suggested for use as a chlorinating agent.

•

A process for vulcanizing aluminum sheet or foil onto rubber will shortly find a commercial application. Developed by Reynolds Metals Co., the method will be used to make a household stove and counter mat to be made by Rubbermaid, Inc. (Wooster, O.).

Reynolds says the process has been made possible by a special aluminum coating it developed. It applies the coating, ships it to the customer. When the rubber is vulcanized, the aluminum is integrally joined.

Other uses for the technique foreseen by Reynolds: to make aluminum tire cords, flexible aluminum-covered pipe and tubing, tenting and tarpaulins.

•

A joint agreement to develop sodium borohydride bleaching of pulp and paper has been signed by Metal Hydrides and MO och DOMSJO AKTIEBOLAG (Ornskoldsvik, Sweden). MHI will administer licenses owned by MODO in the U.S. dealing with treatment of cellulosic materials with the borohydride.

•

Another joint computer control effort: Westinghouse and Remington Rand will jointly develop and market process control computer systems. Meanwhile, an oil equipment firm, Schlumberger, Ltd. (Houston, Tex.), is moving to link with Daystrom Inc., manufacturer of control systems.

COMMERCIAL SOLVENTS CORPORATION

NITROPARAFFINS DEPARTMENT

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IN CANADA: The McArthur Chemical Co., Ltd., Montreal • IN MEXICO: Comsolmex, S.A., Mexico 7, D.F.

SUBJECT:	2-Nitropropane	DESCRIPTION:	Solvent for vinyl and epoxy coatings	ACTION DESIRED:	Consider 2-NP to achieve higher quality at lower cost

General

2-NP ($CH_3CHNO_2CH_3$) is a member of the extraordinarily versatile CSC Nitroparaffin family. Its most outstanding characteristic is its unique solvent property which permits the use of larger proportions of low cost alcohols and aromatics in solubilizing a wide variety of coating materials, dyes, organic chemicals, fats, and oils. This unique property is of special interest in the formulation of vinyl and epoxy coatings.

Solvent for Vinyls

With the introduction of 2-NP—for the first time—formulators of vinyl chloride-acetate copolymers were able to obtain coatings with 1) lower viscosity and/or higher solids, 2) medium evaporation rate with better flow, 3) improved solvent release resulting in reduced drying time, and 4) mild odor. In addition to these advantages, the ability of nitrated solvents to displace water results in coatings with better adhesion to hydrophilic surfaces and better weathering properties due to improved dispersion. 2-NP's high flash point and low volatility provide added safety factors.

Research and field experience in the packaging industry have shown that the high solids content of 2-NP-formulated vinyls offers important advantages in the high-speed coating of food and beverage containers. 2-NP also proves useful in vinyl ink applications since it does not attack gelatin or most rubber rolls but still provides outstanding adhesion or "bite" to many plastics.

Low Viscosity and/or High Solids Content

2-NP can be formulated to give vinyl solutions of higher solids content and/or lower viscosity than any other medium evaporating solvent. In addition, 2-NP solutions have good stability and show no tendency to gel.

Reduced Cost

In VYHH* solutions, to obtain comparable solids and viscosities, a 50-50 mixture of MIBK-toluol can be replaced by a 30-70 mixture of 2-NP-toluol. This makes it possible for a vinyl formulator to save over $600 in raw material costs for each tank car of MIBK he now uses.

Solvent for Epoxies

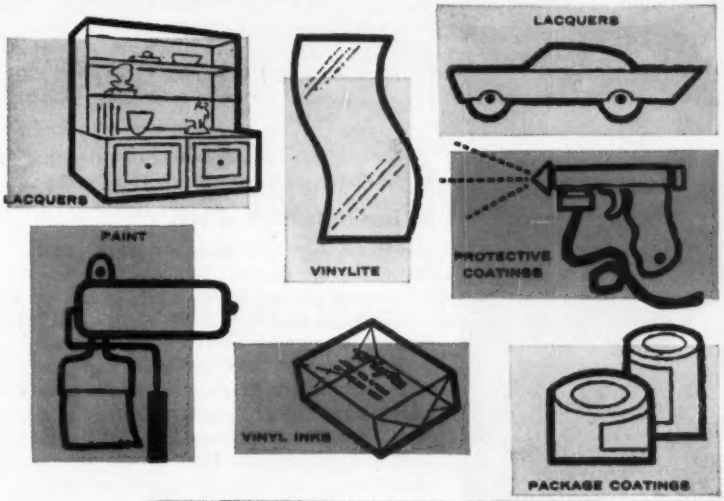
Solvent mixtures based on 2-NP have been found to be superior to other solvent systems for epoxy coatings cured at room temperature. Improvments brought about by the use of 2-NP include much greater chemical resistance, marked reduction in pinholing and water vapor permeability, minimized crawling and cratering, and improved adhesion.

2-NP is compatible with amine catalyzed systems (with the exception of ethylene diamine) and systems employing urea-formaldehyde, polyamides, or phenolic cross linking agents.

The ability of nitrated solvents to wet pigments and hydrophilic surfaces, as previously mentioned in the section entitled *Solvents for Vinyls*, also applies to epoxies as well as other vehicles used by the coating industry.

Want more information on 2-NP for Vinyls and Epoxies?

If you would like to have test samples and complete technical data on 2-Nitropropane for your vinyl and epoxy formulations, fill in and mail the coupon below.



Nitroparaffins Department
COMMERCIAL SOLVENTS CORPORATION
260 Madison Ave., New York 16, N.Y.

_____Please send me samples and data on 2-NP for vinyl and epoxy coatings.

_____Please have your technical representative get in touch with me.

*Name*_____

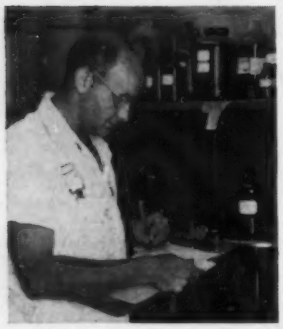
*Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

COMMENTS on a few Eastman Organic Chemicals

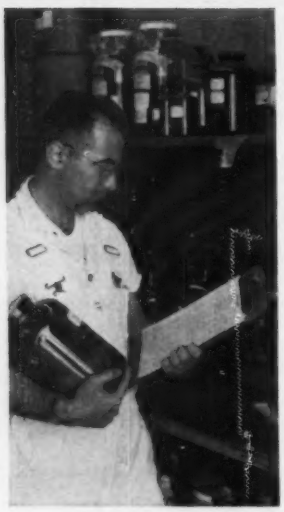


He made *Methanesulfonyl Fluoride* (Eastman 8368) and is turning it in for final testing.

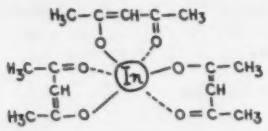
How the mind wanders

THIS is the result of a day spent listening in on the ACS Division of Medicinal Chemistry and in particular a paper on "Preparation of Some Purinesulfonamides from the Corresponding Purinesulfonylfluorides." We don't recall its content with any precision. What the speaker succeeded in doing to us was to impress us with the strong role being played in biochemical thought today by the sulfonyl group. His mind was doubtless illuminating the big picture, but our mind was narrowing down to the little picture. Here was a trend, and we ought to make sure we were riding it well.

We offer *Methanesulfonic Acid*, *Methanesulfonic Anhydride*, *n-Butyl Methanesulfonate*, *Ethyl Methanesulfonate*, *Methyl Methanesulfonate*, and *Methanesulfonyl Chloride*. This fellow, we noted, was talking sulfonylfluoride. We have a man who is skilled in the art of exchanging any halogen for any other. We decided that as soon as we got home we would have him switch over some chloride to fluoride. That he has done. We are now ready to accept our small but rightful reward for thoughtfulness.



He made *Tris(2,4-pentanediono)indium* (Eastman 8015) and is turning it in for final testing.



A speculation in indium

THIS chelate we may look back upon as marking one more stage along chemistry's road from cookbook to quantum mechanics. Must be close to halfway by now.

Our story about the indium chelate of acetylacetone starts with a strong kitchen flavor. We made it as a tag for tagging silicone lubricants to facilitate spectrographic identification of suspicious spots. Such detective stunts are part of the way of life in a film factory. Then it occurred to us that others—perhaps some engaged in the mysteries of setting up catalyst beds—might like an indium compound of definite composition and solubility properties. Perhaps they think more in terms of electron configuration than of recipes. Perhaps they might find the effect of enolate resonance on the normal $5s^2\ 5p^1$ configuration of the indium atom puts it in the right condition to join the rest of a catalyst system, after which the organic accoutrement of the indium is burned off and reaction rates shoot way, way up and everybody has a wonderful time. Perhaps and perhaps not.

Meanwhile, when on more solid ground analysts and biochemists think of chelates, they think of EDTA. For them we have just added (*Ethylenedinitrilo)tetraacetic Acid Dicalcium Salt* (Eastman 8364). Often have they made this chelate while adding EDTA to blood serum or hard water. Now they can buy it. It is handy for maintaining a known concentration of calcium ions by making them hard to get at.

He made *1,2,3-Cyclohexanetrione Trioxime* (Eastman 7660) and is turning it in for final testing.

An isonitroso more or less

THIS seems to suggest some sort of generalization about the reagents business that we are not sure we are capable of facing up to.

In 1958 we set out to make a certain nickel reagent we had read about. Our method failed. It hung three instead of two isonitroso groups onto a monomethylated cyclohexane ring. We meekly advertised that we had *5-Methyl-1,2,3-cyclohexanetrione Trioxime* for sale as Eastman 7478 and hoped somebody would discover what *it* is a reagent for. (Some are amused by our candor in these matters.) The ad mentioned that in seeking the cause of our failure we had repeated our procedure on the unsubstituted ring and had similarly obtained *1,2,3-Cyclohexanetrione Trioxime*, which we designated Eastman 7660.

The sad little sigh with which we closed the discussion spread out over the world. A friendly echo has now returned from Agnes Scott College, Decatur, Ga. Four sympathetic chemists there startle us by reporting that Eastman 7660 forms a very stable and spectrophotometrically convenient complex with cobalt at an optimum concentration range of 1 to 4 p.p.m.

Reading this (*Anal. Chem. 33*, 1096), we checked to make sure old 7660 was still there and were again astonished to find that the original batch had sold down to inventory minimum! We now have a new batch, a free abstract of the cobalt determination, and a feeling that purposeful planning serves chiefly to comfort the soul.

THIS is the point: to keep us busy, you keep a copy of "Eastman Organic Chemicals, List No. 42" handy and use it from time to time to find and order the organic you happen to need at the moment. Many of our chemicals are stocked by laboratory supply dealers. The abstract of the cobalt determination we offer largely to be helpful. For it or List No. 42, write to *Distillation Products Industries*, Rochester 3, N. Y.

DPi

Eastman Organic Chemicals

Distillation Products Industries *is a division of* **Eastman Kodak Company**

PACKAGED Small packages for many chemicals are becoming less and less important.

VS. BULK The trend, CW survey reveals, is toward making more shipments in bulk.

Shippers Boost Bargains in Bulk

New bulk-delivery carriers — all geared to use by the chemical process industries — are making their debut, sharpening producers' interest in moving products more cheaply. For chemical companies in particular — a Chemical Week survey shows — this concern is underscored in their continuing turn toward bulk delivery (CW, July 22, p.59).

One example of the new trend is Wyandotte Chemical Corp.'s (Wyandotte, Mich.) operations—about 93% of all its basic chemicals now move in bulk. Wyandotte customers can slash costs 10% if they switch from bags and drums to barge and train loads. Cases in point: prices of Wyandotte's Purecal O, a precipitated calcium carbonate, drop more than 11% when a purchaser uses hopper cars instead of individual bags; and soda ash buyers pocket a 20% savings with rail shipments. In fact, since Wyandotte's urethane and surfactant polyols shipments are now virtually restricted to bulk delivery — usually by tank car — customers pay a 20% premium for the privilege of getting the same products in drums.

Rail shipments still score as the major method in bulk handling at Wyandotte plants, although barges and trucks — the latter for short hauls — have made some inroads during the past few years. For instance, from company facilities in Wyandotte, Mich., and Geismar, La., barges carry out 50-60% of Wyandotte's caustic soda, 25-30% of its chlorine.

Poly on the Rails: Support for rail shipments of CPI products — carrying bulk polyethylene by hopper car — got a big boost when Dow Chemical's (Midland, Mich.) Texas Division, adding to its current line, purchased 50 Dry-Flo Chem cars from the Chicago-based General American Transportation Corp. (GATX). Dow expects the cars to be operating by October for its Texas branch, which already makes 35-40 rail shipments of polyethylene monthly.

Hopper cars specially built for the job, like the Dry-Flo Chem, simplify the handling that unit containers must

go through. Polyethylene granules are hauled in hoppers in about the same way wheat moves to the market, and loading a hopper car with polyethylene takes just one-fifth the time required to package the same amount. There is less handling of the granules, and producers' warehouse storage is obviated, since the material goes directly from silo to hopper cars.

Dow estimates that fully 60% of its polyethylene production will move in rail hoppers within the next few months. The GATX cars each handle up to 120,000 lbs. at a time, and the three compartments that divide each car could be used to hold three different types of polyethylene.

Furthering the CPI shifts to rails, Transport Leasing Co., a subsidiary of Pullman Inc., has leased 46 covered hopper cars to Union Carbide Plastics (New York). With its Chem-O-Vac, slated primarily for hauling polyethylene, Pullman has made its initial entry into CPI distribution.

Break into Bulk: Shell Chemical Co. will switch its Western fertilizer operations wholly to bulk shipping. Shell moves 80-85% of its fertilizer by truck — both in bags and in bulk.

Shell is now conducting field tests with a completely collapsible, corrugated container — the Bulk-Bin — made by Corrobilt Container Co. (San Leandro, Calif.). Shell management says the disposable bins will cost much less than multiwall bags. The bin holds more than 2,400 lbs. of fertilizer. For liquids, Corrobilt offers a 200-gal. waterproof container with an added polyethylene inner bag for further protection. (Cost of coated container without liner, $5.75/1,000; uncoated, $5.60/1,000.) Shell estimates the life of the bin at three trips.

Another user of Corrobilt bins, Valley Nitrogen (Helm, Calif.) fills them with 2,600 lbs. of fertilizer and ships this cargo to a distribution center, where each bin is emptied into the customers' own containers in about four seconds — the bin's bottom drops away.

All these new shipping devices arise from what has become one of the most salient situations in the CPI today: keen competition requires producers to get products conveniently to customers at the lowest possible cost. The race is on to find better ways to do this.

Olin's Collyer: With no competition, how high will shipping rates go?

By Water or by Land

In three recent actions—each of which could affect chemical shipments—the Interstate Commerce Commission (1) backed a Senate Commerce Committee bill that would allow inland water carriers to mix, for six months, exempt and nonexempt commodities in the same tow; (2) blocked the New York Central Railroad's attempt to suspend less-than-carload shipments to some 33 cities on the Central's routes; and (3) allowed, in what is possibly a precedent-setting decision, the Lehigh Valley Railroad to haul cement through its trucking subsidiary.

On the Waterways: Topping the list in importance is the current barge legislation, just reported out of hearings and set for the Senate floor before the end of the present session. If passed, the bill will add a single sentence to Section 303 (b) of the Interstate Commerce Act that will clearly spell out the rights of regulated carriers to move, if they want, such things as nonregulated (rates set strictly by negotiation between parties involved) bulk sulfur and automobiles as one-barge cargo anywhere along the intracoastal waterways.

The regulated carriers applaud the legislation, see it as official recognition of a practice, okayed by ICC, that before had been "read" into the Commerce Act. But the smaller lines, dealing wholly in nonregulated commodities, are dead set against the revision. The core of their objections is the traditional one: the majors, with greater tow capacities, could cut costs low enough to drive minors out of the water.

And this stand is solidly backed by John Collyer, Olin Mathieson's assistant director of transportation. He underlined the possibility that with no other competition, the regulated carriers could push up rates to shippers on such exempt items as sulfur, alumina, phosphate.

ICC and the Kennedy Administration, however, see the measure as only a step toward the outright repeal of bulk cargo exemptions on the waterways. Further legislation may come up in '62 that would bring all barge traffic under ICC domain. And this would mean making public business now kept completely private between many CPI firms and what one executive calls their "captive barge companies."

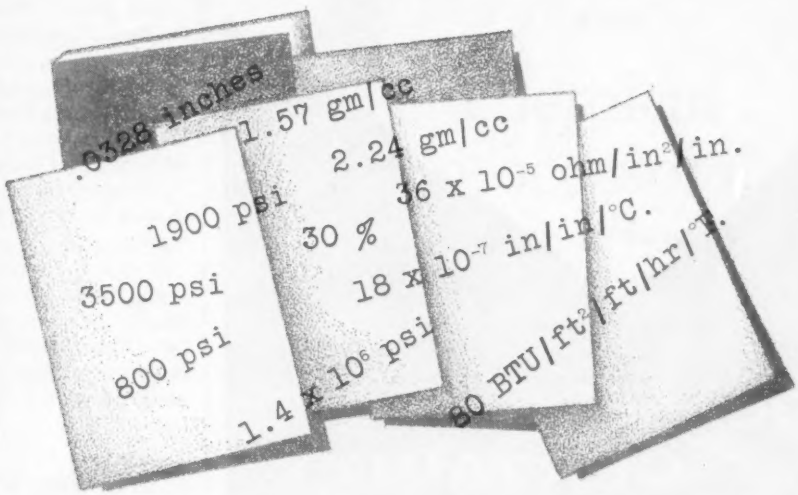
Overland: This squabble could turn some water-shipping business back to the railroads, but, until that happens, railroads continue to hunt for ways to save money. Among the cities that would have been hit by the New York Central's attempted cutback of costly less-than-carload (LCL) deliveries are Springfield, Mass.; Rochester, N.Y.; Elkhart, Ind.; and Dayton, O. But a spot check of several chemical companies in these areas shows that the effect of the proposed embargo probably wouldn't have been very noticeable. Most companies, like Shawinigan Resins (Springfield, Mass.) and Miles Chemical (Elkhart, Ind.) try as much as possible to stay away from LCL shipments. And when they do ship less than carloads, CPI firms usually rely on trucks.

However, the railroads did make some headway when ICC, although preventing four other lines from doing the same thing, allowed the Lehigh Valley to transport cement by its trucks. (Reason: Lehigh's poor financial condition.) Reportedly, the trucking industry was surprised by the decision since the carriers consider over-the-road cargoes as strictly within their bailiwick.

Heretofore, railroads have been allowed to use their trucks only in moving goods from rail freight depots to customers—not over the road, as in the Lehigh decision. Truckers feel this is dangerous, point out that many railroads, particularly in the East, now have financial problems.

NEW TECHNICAL DATA SHEETS AVAILABLE TO GLC ANODE CUSTOMERS

Recently issued data sheets prepared by our Technical Department contain important information about graphite anode properties.



Among the typical physical properties detailed for anodes in various grades and sizes are maximum particle sizes... apparent and real density... porosity... resistivity... rupture... compressive and tensile strength... elasticity... thermal expansion and conductivity.

Typical chemical properties of the anode grades show percentages of ash, sulfur, silicon, iron, calcium, aluminum, vanadium sodium, titanium and other impurities.

Data on the surface finishing obtainable in various machining operations are also included.

We shall be happy to furnish a set of these technical data sheets, with our compliments, to anode users everywhere. Your request will be most welcome.

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UNION CARBIDE

Speaking of Weather

Doing something with the weather, rather than about it, is the idea behind St. Regis Paper Co.'s (New York) new sales promotion pitch.

The company's Bag Division is offering a monthly four-page newsletter —*Weathervane*—which features a 30-day, countrywide weather forecast, and a weather estimate for the following month, with maps and charts in color. Its purpose: to help customers determine if coming weather will alter their current marketing plans. The reader is also exposed to a frontpage ad, which changes with each issue, for a company product. (For September: "Grip 'N Rip" sewn bags.)

The detailed information comes to St. Regis from Weather Trends, Inc., (New York) a private weather forecasting agency, which claims 75% to 85% accuracy in its predictions. Weather Trends does the printing, while St. Regis handles the mail, sending some 6,000 copies to its customers a week before the beginning of each month.

Started in July, this service has already drawn favorable comments—one firm wants an additional 60 copies for further distribution—and St. Regis management has learned of widespread attention to *Weathervane*'s messages.

Marketing Liability?

Signaling the end of an era in antifreeze selling, Union Carbide—the last holdout—has dropped "fair trading" in all but three states. The company believes that fair trading will become a marketing liability in the fiercely competitive fall season about to start (CW, March 11, p. 87).

Carbide figures that in the three states where it is still maintaining fair trade — California, Arizona, and Nevada — conditions prevailing through the rest of the country do not apply. Although antifreeze has been selling very well in these warm-weather states, it hasn't caught the public's fancy enough to set off a do-it-yourself trend. "Mass retailers there simply have not elected to promote antifreeze," says Carbide's R. P. Bergen.

At the time it dropped fair trade, Carbide had several hundred permanent injunctions out against discount-

ers in the 23 states where fair trade is permitted. Carbide says it was not only spending a great deal of time and money policing retail prices, but also found itself at a competitive disadvantage against companies whose brands were being discounted. However, if a federal fair trade bill is passed (two are before Congress now) Carbide indicates it might give price control another try.

Possibly more important to the future of the antifreeze business is what is happening in Detroit this year. American Motors is equipping all its cars with factory-installed Dowgard (*CW Business Newsletter, Sept. 2*). And Ford Motor Co. is factory-installing "extended-range" antifreezes in all its cars this year.

All automobile manufacturers put antifreeze into cars produced during cold-weather months in order to get them to the dealers in running order. But this is the first year that the makers have put in beyond-the-ordinary antifreeze, made it a sales point. Ford is buying its antifreeze from Union Carbide and Wyandotte Chemicals, advertises it to be good for 24 months. The key to Ford's coolant change (as it is with Dowgard) is control of the water purity (use of deionized water eliminates many corrosion problems).

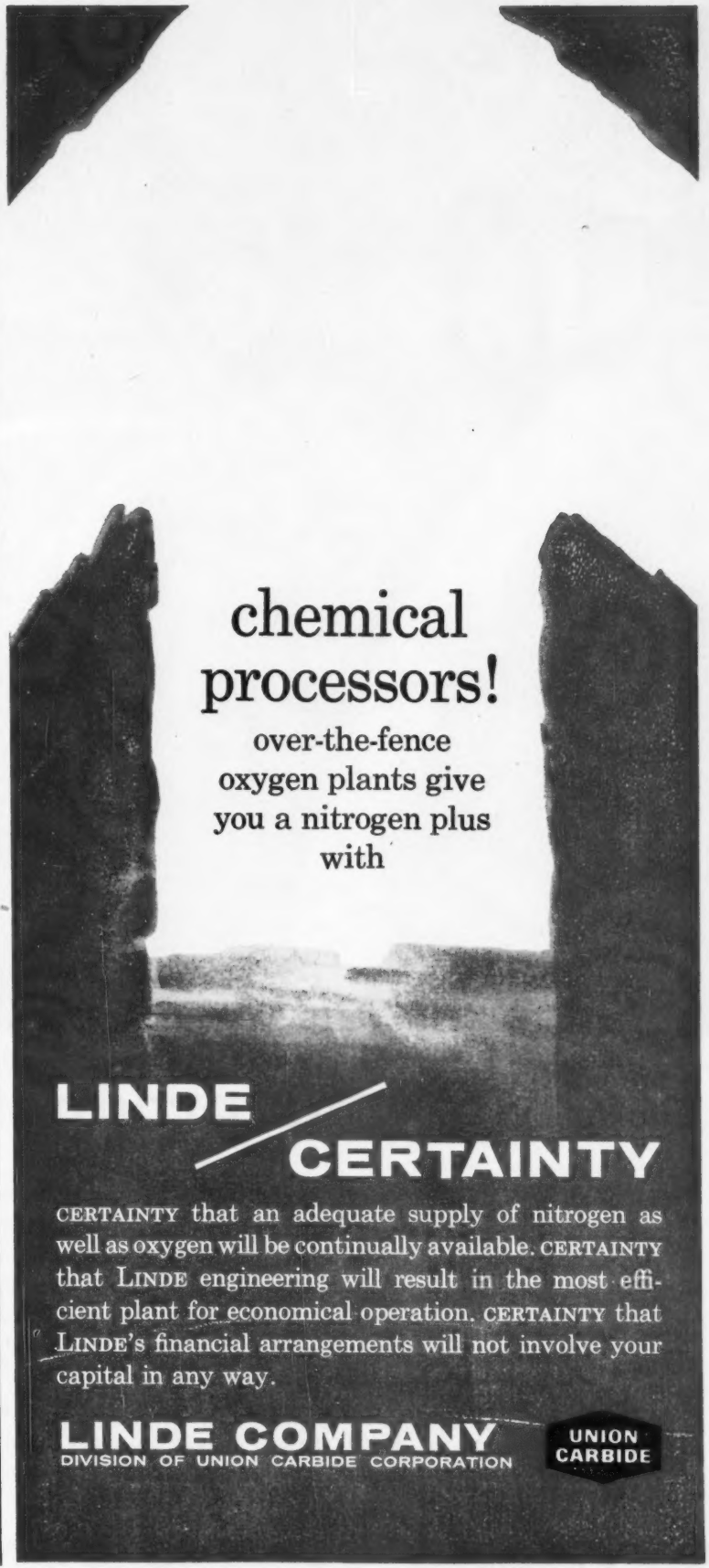
Meanwhile, Marvin Teutsch, the Houston, Tex., inventor who is suing Dow over alleged unfair competition from Dowgard advertising (*CW Business Newsletter, June 10*), has also filed a complaint with the Federal Trade Commission, making the same charges.

New Face at 3 M

Minnesota Mining and Mfg. Co. (St. Paul, Minn.) has joined the swelling ranks of CPI companies that have undergone a "face-lifting." The firm unveiled its new logotype, designed to point up the shorter, commonly used company name: 3M.

The 3M symbol replaces a flock of about 50 company trademarks. Stocks of literature, letterheads and packaging supplies will be used until exhausted.

J. C. Duke, executive vice-president for sales administration pointed out that the company hopes to gain easier market acceptance for new products and continued sales growth from wide use of the new identification.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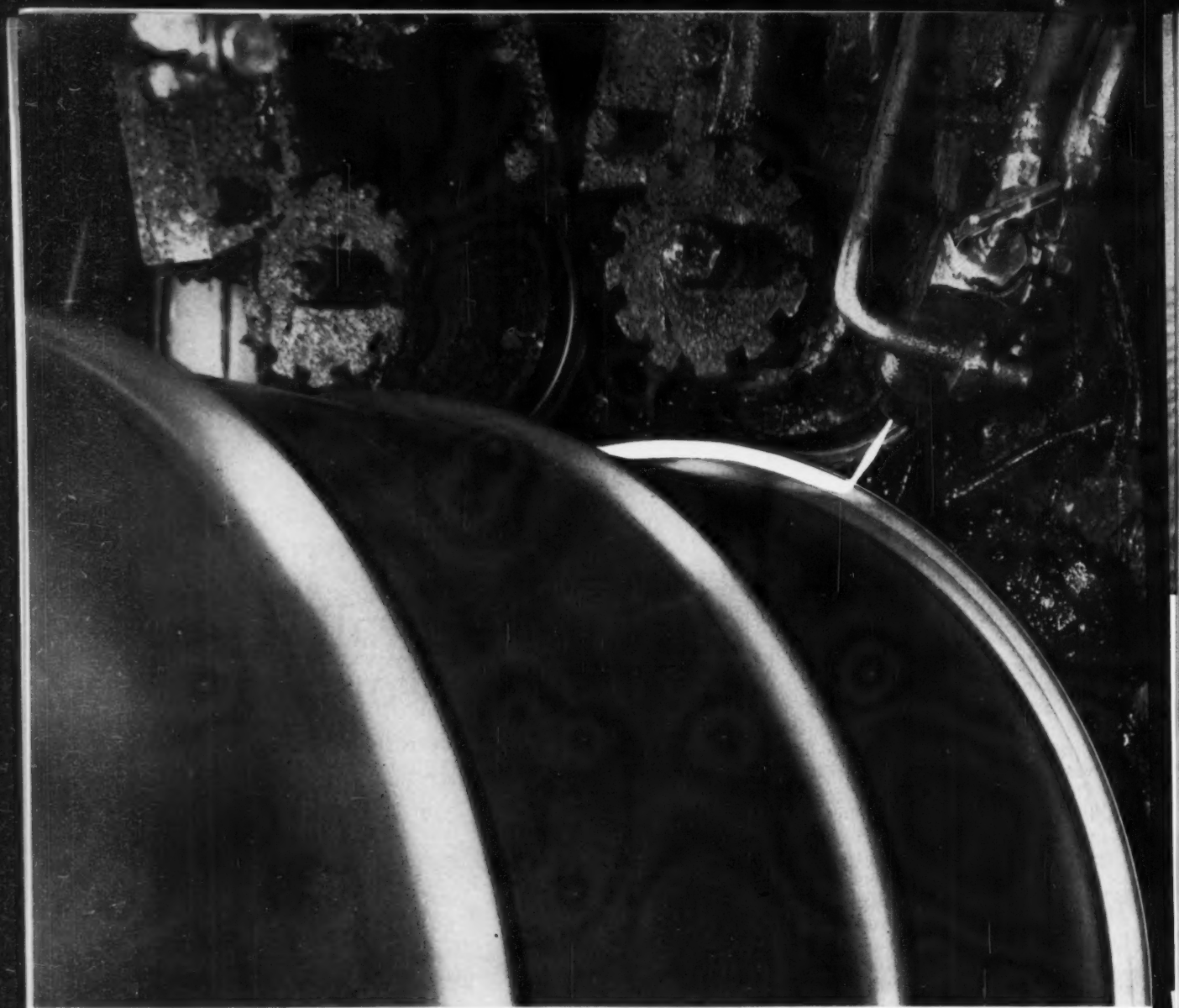

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We supply drums quickly . . . we line them to your specifications . . . and we make them so that you're sure of your product's future. Call us today.

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Information Centers Help Ring Up Sales

A nationwide network of product information centers will soon be helping to make it easier to do business with Du Pont. Designed to supply quick answers to telephoned customer questions about Du Pont's 8,000 products, speed order-taking and cut sales costs, the net-work has already proved its worth on a tryout basis. Permanent headquarters will be established in Wilmington within the next few weeks.

At the present temporary headquarters, four trained "information expediters" have been on the job since late '60. Equipped with a newly compiled directory of Du Pont products, they accept phoned inquiries (but don't themselves answer questions), route calls to the appropriate "experts," convince inquirers that their calls are not being lost in a vast and complex organization.

Similar centers have now been established in Boston, Chicago, Los Angeles, New York and San Francisco. Staffers answer most questions on the spot but can relay them to Wilmington by tie line if necessary.

Although "unadvertised," the centers have been consulted widely in their short-term existence. Late this fall, to make the public more familiar with them, Du Pont will begin listing the "information number" in the yellow pages of major cities' telephone directories.

Although most numbers are local ones, those in key Eastern cities* will be routed to the product information center in Wilmington (PRospect 4-2421).

Also, the company has printed *Product Information Guide*, a 12-page reference listing major products offered by each Du Pont department and phone numbers in various cities that will reach representatives of each department directly. For example, the telephone number for general product information in Boston is TWinbrook 9-8300. But HAncock 6-1724 is the direct source in Du Pont's Explosives Dept. First major distribution of the new brochure will be as an insert in the CHEMICAL WEEK Buyer's Guide (Sept. 30, '61).

Man in a Hurry: The idea of infor-

*Washington (ENterprise 1-3131), Baltimore (ENterprise 9-4242), Trenton, N.J. (WAlnut 3-2493), and Philadelphia (WAlnut 3-2493).

Du Pont's Darling originated the company's new phone-answering system.

mation centers was conceived by Robert Darling, manager of the records division of the Secretary's Dept. A study by Darling in '58 showed that potential customers sometimes had to talk to as many as six Du Ponters to get a useful answer — particularly vexing when the calls were long-distance.

Darling organized the original Wilmington information center to answer questions promptly, even on weekends. He also asked general managers of each division in the company to nominate experts (e.g., in nylon hose) to be "at the ready" for questions in their fields.

The major centers are booming already. The Wilmington center handles 1,200 calls/month; Los Angeles, 800/month; San Francisco and Chicago, 400/month each; New York, 850/month; Boston, 150/month. Callers, Darling figures, are finally getting their dime's worth. By making such calls easier, he figures, there'll be more calls and more sales, eventually. Since resulting sales can be made with fewer people involved, sales costs will be lowered, a corrolary also of speedier order-taking.

Offbeat Queries: Although most inquiries are about products, they can vary greatly. One caller wanted to know the location of a former Du Pont employee who was an expert on "divining rods" and had written a book on the subject. Another wanted advice on coping with rats eating holes in the polyethylene tubing used in his business.

Answering one such call had a special payoff. The inquiry came from a fourth-grade student who needed to "know all about chemistry" for a term paper. Du Pont helped out (to a degree), later received a thank-you note stating that "daddy liked my paper very much." "Daddy" was a purchasing agent for a large chemical buyer, and this unusual acquaintance resulted in an order for a Du Pont product.

Frequently, hospitals request information on the toxicity of a substance swallowed by a child. (These calls are quickly relayed to Allan J. Fleming, an expert on toxicity ratings and antidotes, in the Du Pont Medical Center).

Profit Pattern: Product information centers are particularly useful to a company producing a wide range of products and materials, in Darling's opinion. He notes that complaints about slow response to customer queries are diminishing. Other large companies tell CHEMICAL WEEK they are watching Du Pont's program with much interest. (U.S. Rubber, for example, recently opened a Product Information Center in New York.) The payoff, they reason, is measured in more than dollars.

LABOR

Settlements: Du Pont's Chambers Works (Deepwater, N.J.) and the Chemical Workers Assn. have settled on a pay increase for wage roll and nonexempt salary employees. The wage hikes, effective immediately, are 6, 7 or 8¢/hour, depending on employees' job classification. Nonexempt employees included in the bargaining units will receive monthly pay boosts of $11, $13 or $14, depending on job classification.

• Hourly rated employees of Crossett Co's. principal manufacturing divisions are now receiving higher rates of pay and improved fringe benefits as a result of recent negotiations at Crossett Chemical Co. and Crossett Paper Mills and the beginning of second-year provisions of a two-year contract at Crossett Lumber Co.

Crossett Chemical (Crossett, Ark.) and the International Woodworkers of America, Local 5-475, signed a new two-year contract that provides for two wage increases during the life of the contract and other changes in employee benefit programs. The contract calls for an immediate boost of 2¢/hour to all hourly rated employees and an additional 4¢/hour beginning in July '62. Also effective in July '62, three weeks' vacation will be provided for 10 years' employment rather than for 12 under the old contract, and the shift premium will be increased 2¢/hour.

Crossett Paper Mills production and maintenance employees entered into one-year contracts providing for wage increases of 3½¢/hour.

• Union members at the Merchants Rubber plant of Dominion Rubber Co. (Kitchener, Ont.) have voted to accept a two-year contract with Local 67, United Rubber Workers of America. Male employees will get a 3¢/hour pay raise effective immediately and a 3½¢/hour increase next April 1. Female employees will get 1½¢/hour now and the same next April 1. The previous contract, which expired last May 31, provided for average hourly wages of $1.63 for men and $1.35 for women.

The union had originally demanded a 4¢ increase for men and 2¢ more for women, both this year and next. Among fringe benefits awarded was a two-week vacation after three years (instead of after five).

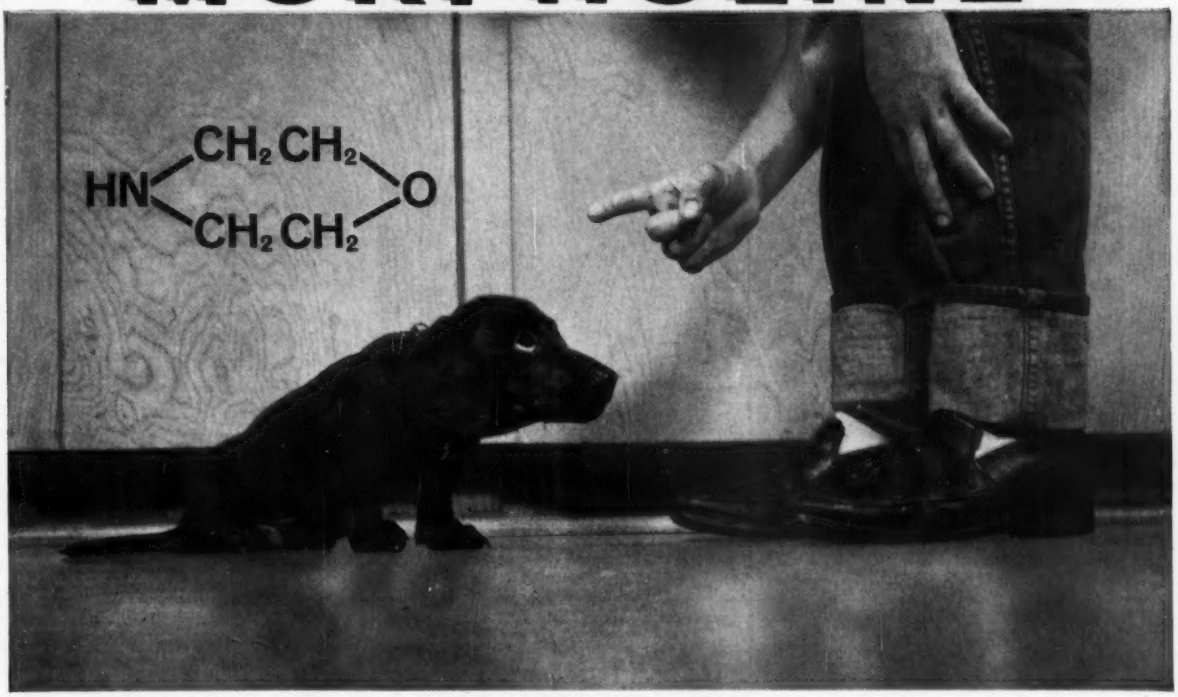
• Employees at the Martinez, Calif., copper chemicals manufacturing plant of Mountain Copper Co. have won a 9¢ hourly wage boost in a two-year contract recently negotiated by Local 1-5, Oil, Chemical and Atomic Workers' International Union. The agreement also provides for an 8¢ increase in the second year, improvements in pensions, sick pay, plus full payment of a health plan by Mountain Copper.

The new contract will go into effect Sept. 1, '61. Most employees covered by the agreement are paid at the No. 2 operator rate, ranging from $2.44 to $3.03/hour before the increase.

• Employees of Spencer Chemical's Jayhawk works (west of Joplin, Mo.) have voted to accept a new one-year contract retroactive to June 1, '61. Acceptance of the agreement was reported jointly by the company and the Business Representative Council of Joplin, a union group. Negotiations had been under way since April. Terms include a 12¢/hour increase.

HARDWORKING JEFFERSON CHEMICALS

MORPHOLINE



Morpholine gives self-polishing waxes their two most important qualities

High gloss and *water resistance*, the two most essential characteristics in good self-polishing waxes, are achieved with morpholine-based emulsifiers. Higher gloss generally depends on fine emulsions, while coarser emulsions yield dull surface coatings. Emulsions prepared with morpholine are distinguished by their stability and small particle size . . . most are less than one micron in diameter.

Superior water resistance in waxes results from morpholine having a volatility approaching that of water. When the loosely bound fatty acid-morpholine compound breaks down, the morpholine component evaporates at approximately the same rate as water. Consequently the resultant wax film is left void of morpholine and has no tendency to re-emulsify when wetted. In both water repellent and moisture impermeability tests, wax films prepared with morpholine are 50 to 60% more effective than films prepared with nonvolatile soaps.

Whatever your applications for this versatile amino ether, Jefferson is pleased to offer technical assistance. Write for Morpholine Technical Brochure . . . Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

SPECIFICATIONS

Specific gravity, 20/20°C.	0.999 min.
	1.004 max.
Boiling range, ASTM, °C.	
IBP:	126.0 min.
DP:	130.0 max.
Purity, wt. %	98.0 min.
Color, Pt-Co scale	15 max.
Water miscibility	
10 cc. in 90 cc. water	No turbidity

SELECT PROPERTIES

Boiling point, °C., 760 mm. Hg	128.9
Flash point, °F., (open cup)	100.0
Freezing point, °C.	-4.9
Weight, 20°C.	8.3 lbs./gal.

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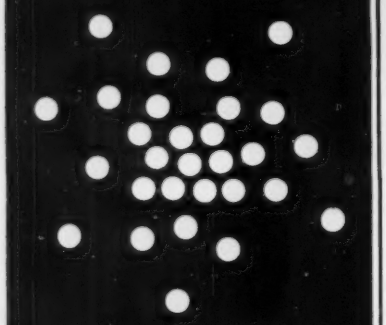

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WIDE WORLD

Gov. Ross Barnett touts advantages for chemical firms in Mississippi.

Mississippi Booster

Mississippi's chief executive, Gov. Ross R. Barnett (above) returned to his home state last week with what could be a key victory in his campaign to draw chemical industry to his state. His achievement was the winning of a giant new oil refinery that may well prove to be a tempting raw-material source for more CPI companies.

The refinery slated for Mississippi is a $125-million complex (*CW Business Newsletter, Aug. 26*); it will be built in the Bayou Casotte Industrial District near Pascagoula. Standard Oil of Kentucky will build the refinery on a 3,000-acre tract after its upcoming merger with Standard Oil of California. Crude oil pipelines from Standard of California in Mississippi and Louisiana will cost several million more dollars.

Standard settled on the site after Barnett's assurance that chances look good for voter ratification, on Oct. 3, of state constitutional changes that: (1) extended from five to 10 years the period that counties may grant ad valorem tax exemptions for industrial purposes; and (2) authorize the sale or 99-year lease of certain school land for industrial purposes. Standard of Kentucky required that the changes be made so it could build the new refinery.

In addition, the Pascagoula channel will be deepened from 32 to 40 ft., with federal or Jackson County funds, to enable seagoing oil tankers to reach the refinery site.

Industrial Lure: Barnett calls the new refinery (100,000-bbls./day capacity, 700 employees) "only an initial investment," says it is sure to grow year by year, attracting many related petrochemical installations, each in itself a major industrial operation and a new source of employment.

Barnett, who has visited more than 25 CPI companies in various parts of the country, says his conferences prove that the executives in many of America's largest corporations recognize that a highly favorable industrial "climate" exists in Mississippi and that they are aware of great potential that exists there for chemical and petrochemical operations "because of our oil, natural gas, water, transportation and available, intelligent workers."

But not everybody in the Magnolia State is happy about the concessions Barnett has made to Kentucky Standard. Armis Hawkins, Houston, Miss., attorney (and President Kennedy's campaign chairman in the state), says the extension of tax exemptions "will rise up to haunt us and our children in the years ahead." He suggests other industries in the state will also request an additional five-year tax exemption. Governor Barnett, he adds, is laying the groundwork for "cutthroat competition between our own counties and future distrust and discord among Mississippians."

LEGAL

No Salt Sale: Dayton, O., officials have canceled rock salt purchase agreements with two companies under indictment for price fixing. They have called for advertisement of new bids, claim that the city is "not legally obligated to purchase salt under the present price agreements."

The city's agreement with Morton Salt Co. and International Salt Co. called for $15.50/ton for rock salt; identical bids were submitted in December. The city could effect a savings of more than $16,000 if new bids range around the $13.20/ton figure recently offered the city of Oakwood.

City officials have agreed to purchase about 7,000 tons of salt on a seasonal basis from Oct. 1 to March 31, '62, instead of on a calendar-year

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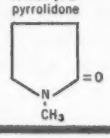
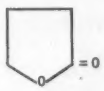
- ease of recovery
- low vapor hazard

	N-Methyl-2-pyrrolidone	Butyrolactone
Structure		
bp (°C)	202	204
mp (°C)	−24	−44
flash p (°F)	204	209
sp gr 25/4°C	1.03	1.12
viscosity cp at 25°C	1.7	1.7
completely miscible with	water, most organic solvents	water, methanol, acetone, benzene, carbon tetrachloride, ethyl ether, monochlorobenzene (immiscible with aliphatic hydrocarbons)

POLYMERS—**Solvents** of unusual utility, Methylpyrrolidone and Butyrolactone can be effectively used for a wide range of resins, including PVA, PVC, polystyrene, nylon and aromatic polyamides, polyesters, polyacrylics, cellulose derivatives, and fluorinated hydrocarbons.

In **surface coatings**, these solvents improve the fluxing and fusing of resins into uniform and continuous films by controlling the rheological properties of the formulation, e.g., methylpyrrolidone speeds coating action of many resins in wire insulation enamels. In **purification** of compounds with limited solubility in other organic media, good yields and high purity can be obtained from these solvents, e.g., recrystallization of terephthalic acid from Methylpyrrolidone and purification of polyamides with Methylpyrrolidone or Butyrolactone. In **paint removers**, in the **stripping of plastisols** or other resinous material from valuable substrates, and in the **solvent welding of plastic films**, Methylpyrrolidone and Butyrolactone act as highly effective softening agents. Methylpyrrolidone is also useful as a **spinning solvent** for synthetic fibers.

AGRICULTURAL CHEMICALS—Methylpyrrolidone is an effective and efficient solvent for mercurial seed disinfectants as well as common insecticides, such as chlordane, DDT, lindane, and toxaphene.

PIGMENTS—Methylpyrrolidone, as a dispersing and wetting agent, facilitates incorporation of organic and inorganic pigments into coating systems. Its dispersing action tends to increase tinctorial strength and reduce color drift. Thus, Methylpyrrolidone provides a means of extending expensive pigments and aids in the economical preparation of a universal tint.

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Butyrolactone is a new extractant for C_4 hydrocarbons in petroleum processing.

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basis, as has been the city's policy. New bids will be awarded about Sept. 20.

•

Parathion Ban: A city ordinance to regulate the sale and use of parathion has been passed by the city council of Tampa, Fla., as a result of four deaths there in the past few months from parathion poisoning. The ordinance limits sale of the poison to licensed exterminators and practicing entomologists.

New Price Suit

The U.S. has filed a civil antitrust suit in federal court against General Dynamics Corp., Olin Mathieson Corp., Air Reduction Co. and Chemetron Corp., charging that they fixed prices of carbon dioxide. Eight other firms were named as coconspirators but not as codefendants.

The government charges that its agencies have been "prevented from receiving competitive bids and have been forced to pay artificially fixed prices for carbon dioxide." The government has asked the court to enjoin the firms for "allocating business, fixing prices, rigging bids, suppressing commerce and exchanging information, bids, prices, terms of conditions."

The government requests that the court compel the four companies to replace the present price schedules with new ones in 60 days.

The four firms, which the government contends produce 80% of the "dry ice" sold in this country, are scheduled to be tried on criminal antitrust charges on Sept. 25. In the criminal action, the government will contend the four firms and four executives flouted provisions of a consent decree filed March 7, '52, and have conspired to fix prices since '53. The Justice Dept. indicated that the criminal charges were a punitive action while the civil action was preventative.

Olin Mathieson and Chemetron were not involved in the original consent decree, but the government contends they aided and abetted the other two in a conspiracy and under federal law can be included in the charge. Olin Mathieson's statement: "We remain confident that the civil suit will not correct the basic flaw in the government contempt case, and we will prove in court that we have done nothing wrong."

KEY CHANGES

B. E. Bochmann to a director, Penick & Ford, Ltd., Inc. (New York).

John B. Schroeder to vice-president and technical director, **Joseph Stavenhagen** to treasurer, Solid State Materials Corp. (East Natick, Mass.).

Rhodes W. Fairbridge to board of directors, Geoscience Instruments Corp. (New York).

George B. Kistiakowsky to board of directors, Cabot Corp. (Boston).

George A. Reilly to vice-president and general counsel, Reilly Tar & Chemical Corp. (Indianapolis), and to general manager, Republic Creosoting Co. (Indianapolis), a division of Reilly Tar.

Thomas L. Gresham to vice-president, Air Products and Chemicals, Inc. (Allentown, Pa.).

Rowland C. W. Brown to general counsel, Dorr-Oliver Inc. (Stamford, Conn.).

Harold H. Zeiss to president and director, Monsanto Research S.A. (Zurich, Switzerland).

Joseph C. Abeles to the board of directors, Firth Sterling, Inc. (Pittsburgh).

P. O. Powers to the board of directors, Pennsylvania Industrial Chemical Corp. (Clairton, Pa.).

Edward T. McNally to chairman of the board, **Maurice Shafer** to president, **E. N. Kunkle** to executive vice-president, **Hans W. Bodlaender** to vice-president. **Lester Ferguson** to assistant to the president, Kennedy Van Saun Manufacturing and Engineering Corp. (New York).

John Gordon Davoud to executive vice-president, Firestone Plastics Co. and Firestone Synthetic Fibers Co. (Pottstown, Pa.).

Richard J. Stull to vice-president, A. S. Aloe Co. (St. Louis), division of Brunswick Corp.

John C. Tinker to vice-president, chemicals firm Clarence Morgan, Inc. (Chicago).

Newman Ward to chairman of the board, **J. J. Davis** to president, **C. F.**

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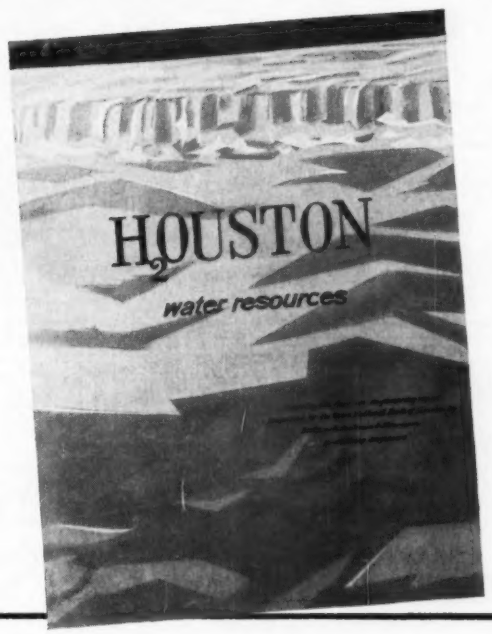

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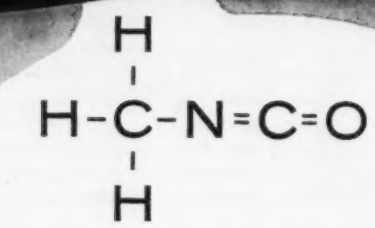

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ADMINISTRATION

Swigert to honorary board chairman, Esco Corp. (Portland, Ore.).

Samuel Zuckerman and **Leslie P. Ogden** to board of directors, H. Kohnstamm & Co., Inc. (New York).

Bayard S. Johnson to manager of chemical sales, RYCO, Inc. (Conshohocken, Pa.).

Robert L. Lozon to vice-president of purchasing and trade relations, The Glidden Co. (Cleveland).

Frederick W. Dow to manager, Dow Chemical International (New York).

Don B. Karlskind to executive vice-president, Chem Seal Corp. of America (Los Angeles).

Paul R. Gilmore to vice-president and general manager, Northeastern region of Forest Products Division of Owens-Illinois Glass Co. (New York).

Paul A. Dunkel to chairman of the board, **William C. Freeman** to president, Paul A. Dunkel & Co. (Jersey City, N.J.), gum importer.

Harold Nutt to chairman of the board and chief executive officer, **James F. Beré** to president and general manager, Borg & Beck Division of Borg-Warner Corp. (Chicago).

H. P. Schrank to president, Seiberling Rubber Co. (Akron, O.).

T. D. Lyons to vice-president, Allis-Chalmers Manufacturing Co. (Milwaukee, Wis.).

John Procopi to vice-president of international operations, Milton Roy Co. (Philadelphia), manufacturer of controlled volume pumps and instrumentation systems.

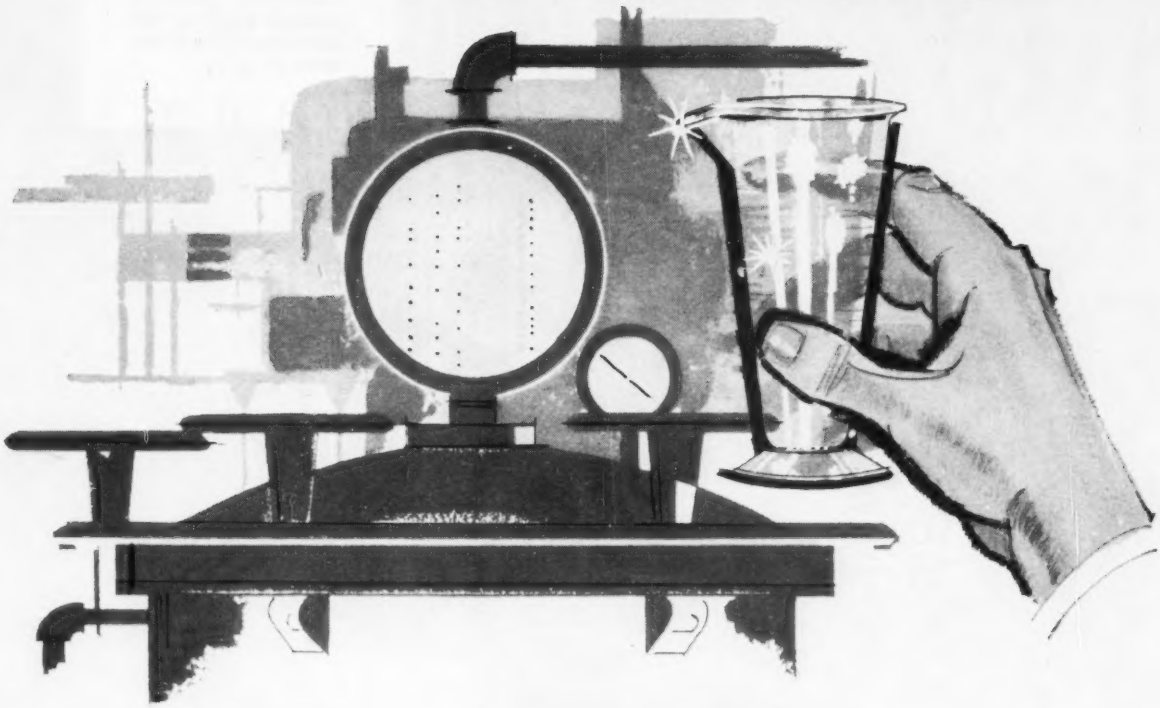
Henry G. Ludwig to comptroller of marketing divisions, Hoffmann-La Roche, Inc. (Nutley, N.J.).

Michael Pisetzner to general manager, Electro-Technical Products Division of Sun Chemical Corp. (Nutley, N.J.).

Fred C. Boucke to assistant chairman of the board of directors, Standard Oil Co. of California (San Francisco).

S. Bruce Humphrey to the board of directors, Carus Chemical Co., Inc. (LaSalle, Ill.).

New Standards of Filtration Control



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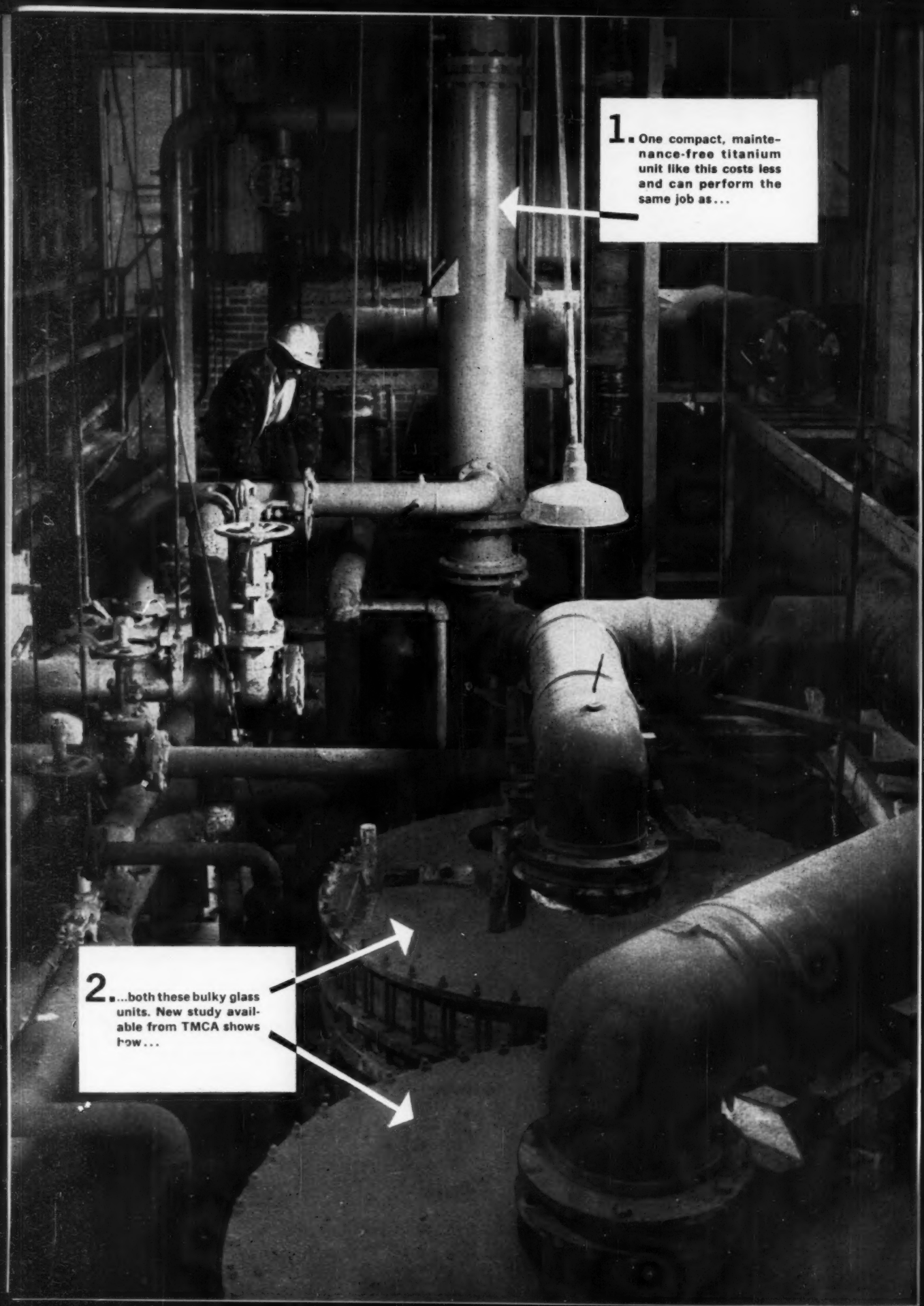

1. One compact, maintenance-free titanium unit like this costs less and can perform the same job as...
2. ...both these bulky glass units. New study available from TMCA shows how...

In wet chlorine...

Lifetime Titanium heat exchangers return 30% on investment, pay for themselves in 2.5 years

According to a new economic study now available through Titanium Metals Corporation of America, titanium heat exchangers for cooling chlorine cell gas can return 30% after taxes on their investment, and pay for themselves in two years and a half, when depreciation is considered.

At the same time they reduce maintenance, increase operating efficiency, save space or allow the use of what is normally wasted space, and eliminate possible product contamination through tube failure.

In existing plants already using contact coolers, the substitution of titanium heat exchangers for steam stripping returns comparable amounts...23% and more on the added investment and a pay-back in three years or less.

These startling returns are gained primarily through reduced operating costs. As the study reveals, a plant producing an average 100 tons a day can save more than $20,000 a year through the use of titanium coolers.

Glass tube coolers, on the other hand, fare less well. In comparison with titanium used in indirect cooling, their initial cost is higher; the return on investment is lower (8.8%); the pay-out time much longer (5.3 years).

WHY TITANIUM?

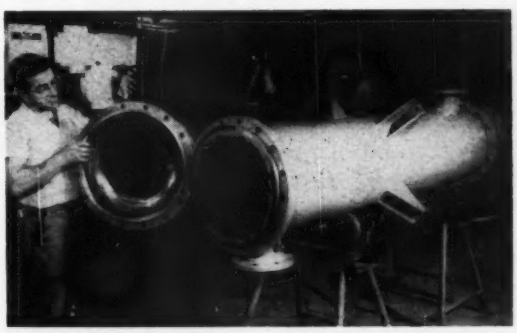
High performance. Among the reasons for titanium's success in this important application are its absolute immunity to wet chlorine corrosion... its lightness and strength, even at high temperatures... its ease of fabrication... and its heat transfer properties, which are significantly better than glass.

Titanium unit costs lowering. TMCA composite price index has dropped from $15.25 in 1954 to $6.97 per pound by early 1961. As fabricators have come to realize that titanium is as easy to fabricate as most steel alloys, these costs have dropped too.

The present study is based on the current price of titanium heat exchangers, which now range from $25 to $30 per square foot, a considerable reduction over the recent past.

Stauffer unit saves space, more efficient. Stauffer Chemical Company, Niagara Falls, N. Y., has a titanium heat exchanger in chlorine cell gas cooling. The titanium unit requires far less space than either of two glass units and yet can carry the same load as the glass units combined. The titanium heat exchanger is installed in relatively inaccessible, formerly "waste" space, since the unit requires no maintenance. Glass coolers require three to four downtimes a year. Stauffer also reports that the titanium cooler operates at greater efficiency and reduces the amount of sulfuric acid needed in final cooling.

How TMCA can help you cut chlorine cell costs. First, write for the study, "New Economies in Cooling Chlorine." If titanium units appear to be able to help you in your battle against cost—and it is highly likely that they can—talk to Titanium Metals Corporation of America. TMCA's Technical Service Department can put you in touch with competent fabricators and supply the technical data needed to help you trim your costs and boost your process efficiency in wet chlorine...inhibited sulfuric acid...hypochlorites...acetic acid...nitric acid ...and other corrosive applications. Write today!



Heat exchanger containing 268 titanium tubes, is used in Stauffer Chemical Company's Niagara Falls, N. Y., plant to cool chlorine gas from 75°C to 40°C. The titanium unit, providing 394 square feet of heat exchange surface area went into operation in 1959, shows no sign of corrosion and needs no maintenance.

This important study is available to you at no cost.
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With usual savings ranging from 8 to 12% (and even more depending on the type of container replaced), an increasing number of companies are using Balex to help solve the cost-price squeeze problem.

Balex solves other problems too. For example, The National Sugar Refining Company selected Balex as a master shipping container for their Jack Frost, Quaker and Godchaux cane sugars. In a check of 52 carloads shipped in Balex containers of 1/110# construction, damage was substantially less than with the 2/70# conventional kraft balers they replaced.

Balex containers are made from an extra-heavy Clupak* extensible paper, newly developed by West Virginia. Also available in wet strength, polyethylene coated, and embossed for extra nonskid protection.

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*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications.

Currently used plant waste analysis tests

Tests	Information derived	Drawbacks
Five-day BOD	Organic content of waste stream	Can't be done in field, requires highly trained technician, slow, doesn't work on some organics
COD	Chemically oxidizable portion of plant waste stream	Can't be done in field, standard analysis requires several hours
Diatometer	Qualitative measure of marine life health in river	Can't be done in field, requires highly trained technician, slow, doesn't define the impurities
Activated char, plus gas chromatography	Kind of organics contributing to stream's taste and odor	Still in experimental stage
Dissolved oxygen, temperature, pH, conductivity, oxidation-reduction potential, chloride ions	Data on conditions affecting marine life of river	Instruments require frequent checking or adjustment
Other routine analysis (e.g., toxicity, suspended particles, metals)	Level of toxicity, solids, metals and other impurities	Can't be done in field, slow

Needed: Better Tests for Pollution Control

Chemical plant management is taking more than a cursory interest in the upcoming (Oct. 12-16) Water Pollution Control Federation's Milwaukee meeting. Plant operators are looking for faster, surer control methods that will cut complexity, confusion and cost from the analysis of plant waste streams.

Although a number of test techniques are now in use (*table, above*), most are lengthy, require highly skilled chemical analysts to run them and don't give a complete picture of the waste stream. So far, there's no test that can be used as an over-all monitor of the waste streams. The new techniques and analyses that might shorten test times and better profile the waste streams are still being evaluated.

BOD Test Need: Typical of the complexity of the problems and changes that are in the offing: speeding up of the BOD (biochemical oxygen demand) test. This method, which measures the oxygen required for stabilization of bacterially decomposable organic matter, has long been the stand-by for determining degree of stream pollution.

Because of this, chemical plants use it—but because it takes five days to complete the standard BOD test it is often used only in "for the record" purposes—not to monitor day-to-day effluents. And although it seems to work well for sewage it won't give satisfactory results with some difficult-to-oxidize organics; some chemical plant wastes can't be checked out in less than 20 days.

Some steps toward speeding up BOD procedures have been made. Rice Institute's Arthur Busch has developed a BOD test that can be completed in one or two days instead of the usual five.

Busch's test not only cuts the length of time samples must be held but also uses smaller test bottles (50 vs. 300 ml.). Consequently, the size of sample storage incubators can be reduced. However, this system is still experimental, requires further comparison with standard BOD test results.

Other short-term BOD tests, which can be run in about one day, give good results in some cases but require the use of special equipment such as a Warburg respirometer.

Time Lapse Problems: In any case, even one-day BOD tests can't be used as waste stream monitors. If a plant has a severe but fluctuating pollution problem (e.g., a leak in an intermittently used chromate catalyst pump) a BOD test that still takes one day or so makes plant trouble-shooting difficult.

"Memories are short about operating conditions of a few days past," says J. Floyd Byrd, supervisor of Procter & Gamble's pollution-control group.

One step toward oxygen monitoring is to use a COD (chemical oxygen demand) test whenever possible, says Tom Powers, director of Dow Chemical's Industrial Service Division (*CW, March 19, '60, p. 47*). Performance of the test commonly takes several hours, although several COD modifications have been developed to ob-

Instruments used to Analyze plant waste streams

Instruments	Manufacturers	Function	Cost
Automatic Colorimetric Analyzer*	Technicon Controls Inc. Chauncey, N.Y. Milton Roy Co. Philadelphia Hagan Chemicals & Controls, Inc. Pittsburgh, Pa.	Radioactivity, chlorine, acidity, chromates, hardness, phenol, turbidity	$1,200-8,000
Automatic Titrator*	Same as above	Chlorine, acidity, chromates, turbidity, hardness	$8,000
Dissolved Oxygen Analyzer	Beckman Instruments Inc. Fullerton, Calif. Industrial Instruments Inc. Cedar Grove, N.J. Hays Corp. Michigan City, Ind. Jarrell-Ash Co. Newtonville, Mass.	Dissolved oxygen (corresponding to level of organic pollution)	$650-1,000
Meters and recorders for common process-control variables (automatic pH, temperature, conductivity, oxidation-reduction potential)	Most instrument makers can adapt instruments for plant waste analysis	Temperature, acidity, alkalinity, dissolved solids, chlorides	$600-800

*Other automatic titrators and colorimetric analyzers are made by Hach Co. (Ames, Ia.), Fisher Scientific Co. (Pittsburgh, Pa.) and others. But these instruments are not used for plant waste analysis.

tain quicker results. The U.S. Dept. of Agriculture developed one procedure that has recently been modified by Manhattan College's W. Wesley Eckenfelder, Jr., to give results in about 10 minutes that are within 5% of results by standard procedure.

Most short COD methods require heating of the sample; USDA, however, has developed another procedure that does not require heating. Results with this "cold" procedure are not as consistent in the hot procedure, but the test is "ideally applicable to field measure," says Eckenfelder.

While the short-term COD procedures come close to filling the bill as stream monitors from a time standpoint, they have shortcomings. Because they often must be reconciled with conventional BOD tests, COD systems are useful primarily where a steady relationship can be established between BOD and COD results. Dow's Powers points out that relationships can't be easily established for complex streams with varying flow rates.

Diatom Story: Ruth Patrick of the Philadelphia Academy of Natural Science champions use of the diatom (microscopic algae) technique for continuous measurement of a stream's over-all pollution level. This plan can be applied even when a stream contains difficult-to-oxidize organics such as benzene and pyridine. The U.S. Public Health Service is using the technique in its data-gathering program; Du Pont is using it at Orange, Tex., to monitor plant waste discharged into the Sabine River.

In the diatom procedure, samples taken from a stream will show a change in the ratio of the various diatoms as the stream becomes polluted (certain species appear to thrive at the expense of others). Performing the test, however, requires several days of expert analysis. And the technique doesn't reveal the amount or type of impurity present in the stream —a drawback that Ruth Patrick is now trying to overcome.

One Analysis: Most chemical companies agree that the main problem in plant waste analysis is to get a complete picture—the results from a variety of tests don't always add up to a useful over-all analysis. Ideal would be a fully automatic analyzer that records the over-all pollution level based on all plant waste stream components. But even the approach that such an instrument would take is still in doubt.

P&G's Byrd and Dow's Powers would like to see a total-organic-matter analyzer. Roy Weston Associates would like an economical instrument to measure biological activity similar to a continuous Warburg or dissolved-oxygen analyzer, and the firm is seriously considering the possibilities of working out such a unit.

Already, dissolved-oxygen analyzers, which give an important index of stream purity (as pollution increases, dissolved oxygen decreases—oxygen concentration below 50% is deadly to marine life) are being made by several instrument manufacturers.

Beckman Instruments is studying the multiple-factor analysis approach —e.g., a device that would automatically monitor pH, oxidation-reduction potential, chlorides, dissolved oxygen, temperature conductivity of streams. The problem: practical initial and operating costs. Beckman estimates the initial cost at $5,000-10,000, depending on the number of factors to be measured.

A number of instruments are already available to measure many of these properties on an individual basis (*see table, above*). Automatic analyzers for one-at-a-time analyses of plant waste streams include Technicon Controls' Autoanalyzer (*CW, Aug. 9, '58,*

Shell has three benzene-producing refineries, located near waterways. Barges like these will carry the bulk of 1961's record output.

BULLETIN:

Shell has increased benzene production to meet your rising needs—capacity now exceeds 80 million gallons per year

Shell has increased its benzene production nearly 500 percent in less than 18 months. Shell's benzene-producing capacity in the U. S. is now the largest in the world.

Shell's stepped-up output comes to you via a nationwide supply network served by 3 refineries.

Read how Shell's increased benzene production can help you meet your rising benzene requirements now.

WITH DEMAND for benzene at an all-time high, and with new uses coming along each year, Shell is producing more benzene now than ever before.

Bigger supplies now

Shell has stepped up production of benzene again. Shell's capacity has already topped 80 million gallons of high purity benzene. *And Shell has nationwide facilities for producing and distributing benzene.*

Widest distribution

Shell Benzene is produced at three refineries. At Wood River, Illinois; Houston, Texas; and Wilmington, California.

NOTE: All three refineries are located near waterways. You can take delivery of Shell Benzene in barges, in tank cars and transport trucks. Deliveries can come direct from the refinery.

Manufacturers choose Shell Benzene when precise control is vital. Its quality is consistently high.

And it is free of Thiophene.

For full facts on Shell Benzene, contact your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry

p. 66), Milton Roy's Chemaylzer, Quantichem and Hagan Chemicals & Controls' Chemonitor. In addition, Kollmorgan Corp.'s Instrument Development Laboratory (North Hampton, Mass.) is developing a similar type of instrument.

Development Problems: One of the major problems that is faced by most instrument users is need for frequent instrument adjustment. Ordinary process-control instruments are usually called on to measure only within a well-known range. But pollution-control instruments must measure streams that may change radically from day to day. Instrument makers have been working to overcome the problem, but are faced, in turn, with another problem—lack of incentive.

In general, improvements in instruments and analysis techniques have come slow. With a few exceptions, where chemical companies have developed instruments for their own specific needs, plant management has been reluctant to assume responsibility for initiating control improvements, and instrument makers haven't been any more eager. For chemical companies, it is a matter of economics: it is difficult to justify tying up working capital in nonproducing instruments (i.e., pollution control), which can cost several thousand dollars initally, several hundred dollars per month to operate. For instrument makers, the limited market often puts a discouragingly high tag on new units.

Moreover, pollution-control authorities have often been hampered by lack of funds for development of instruments and improved techniques.

Also, in many cases, development of new techniques is time consuming.

Rice's Busch worked four years before he came up with the short-cut BOD test—and it is still being tested.

Odor Sensitivity: Often normal analytical procedures break down in the face of taste and odoriferous chemicals. For years, chemical companies such as Dow at Midland have used taste panels to determine the effects chemicals have on the taste of fish—five parts per billion of 2,4- and 2,6-dichlorophenol can't be detected by normal analyses, but it produces an easily recognized off-taste in fish.

Also, harmless but unpleasant odors can be a pollution problem. Kettering Laboratory at the University of Cincinnati has been isolating odor-forming organics with activated carbon filters and identifying them by gas chromatography—test work that is still in the experimental stage.

As pollution-control authorities continue to stiffen local, state and federal regulations, chemical plant management will be faced with the need to tighten controls. The increase in activity in development of new pollution-control test procedures is a good indication that pressures are already beginning to be felt.

EQUIPMENT

Stacked Compressor Coolers: A new type of aftercooler with heads and tubes for vertical stacking to match any compressor size is being offered by Westinghouse Air Brake Co.'s Le Roi Division (Sidney, O.). The coolers keep compressed air cool and dry, are installed in the line between the compressor outlet and the air receiver. Tubes carry 2-8 gal./-minute of water; cooling capacity is increased by adding tube cylinders. Tube units are 48 in. long, have 100-500-cfm. air flows at inlet temperatures of 200-500 F.

•

Teflon Filament Packing: Greene, Tweed & Co. (North Wales, Pa.) is replacing its present grade of gray-brown Teflon braided packing with a new carbon-free, pure white product that cuts overheating during equipment run-in and packing break-in. The packing is said to have 10 times the life of asbestos packing, is heat resistant to 550 F.

•

Instrument Pen: An ultrasonic ballpoint pen that is said to write at linear speed of 9,000 ft./minute and to produce a permanent mark without writing fluids is a new product of Ultrasonic Industries Inc. (Engineers Hill, Plainview, N.Y.). The pen has a small generator that develops high-frequency oscillations, produces a mark on paper that can't be eradicated. The unit can be used in strip-chart recorders.

•

Liquid Metals Valve: Valcor Engineering Corp. (365 Carnegie Ave., Kenilworth, N. J.) is offering a new line of floating-seal valves for handling liquid metal and metal vapor at temperatures to 2200 F and pressures to 1,000 psi. Valve bodies are machined from solid stock; seats are integral parts of inlet and outlet connections welded to the valve body. Bellows serve as a pivot, act as a double seal. Sizes to 1 in. are available.

•

Level Controller: Flo-Tronics Inc.'s Electronic Controls Division (712 W. Ontario Ave., Minneapolis 3) is offering a new instrument that probes and controls the level of liquids and solids. The unit may be used for high- and low-level control, interface indication or multiple-level detection of both dense and light materials. As the level in the vessel or hopper changes, it alters the capacitance of the stainless-steel, Teflon-insulated probe, activating the control relay.

•

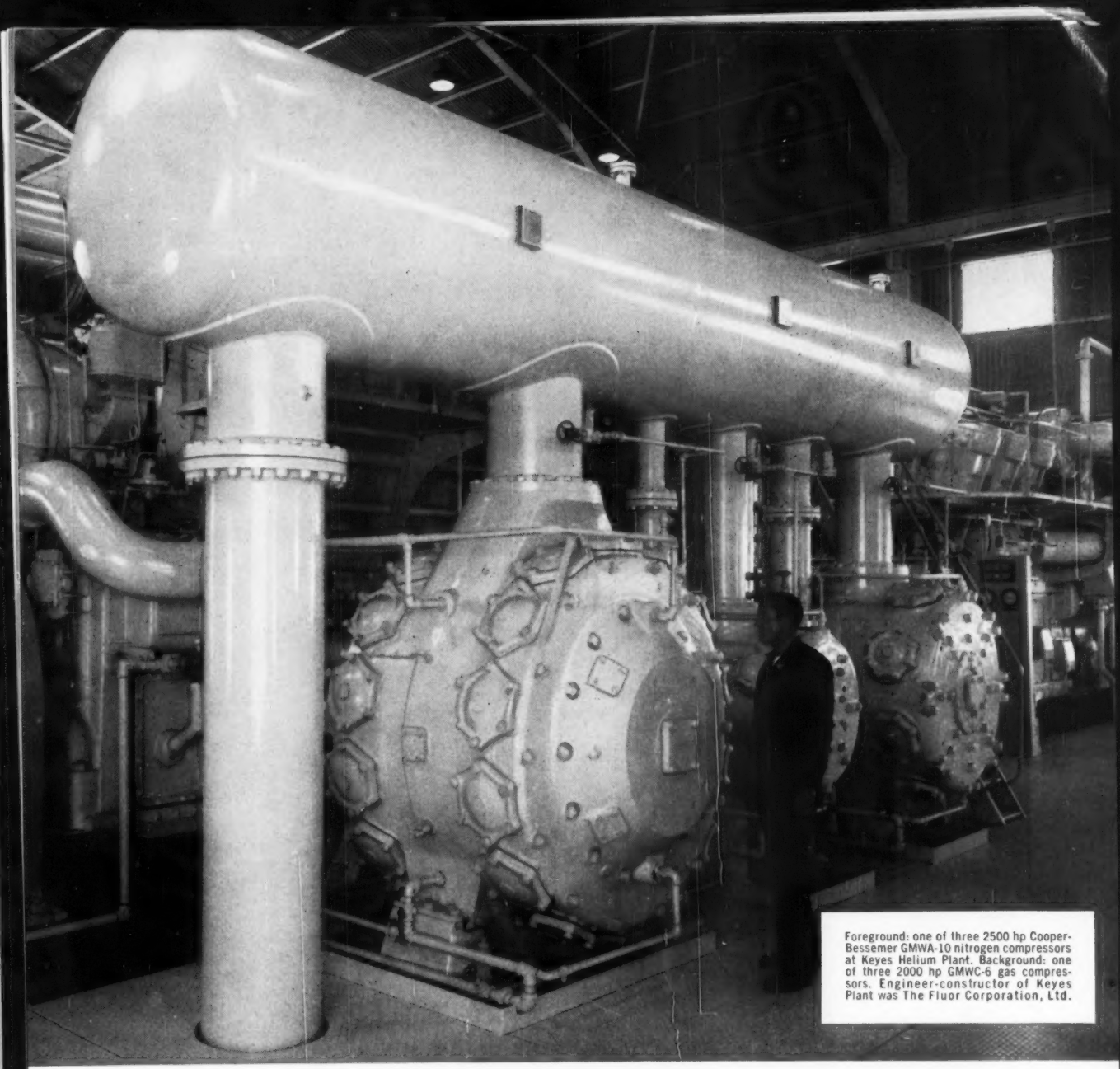
Bidirectional Counter: A new bidirectional counter for numerical readout or recording has been introduced by Crane Co.'s Hydro-Aire Division (300 Winona Blvd., Burbank, Calif.) The device may be used with automatic machine control or process control (e.g., differential flowmetering). The counter operates in either direction (e.g., when counting from +3 to —3 it counts 3,2,1, zero, minus 3,2,1). This flexibility, says CC, eliminates need for external reset (to establish a reference) and reduces over-all cost and complexity by cutting total number of parts.

•

High-Speed Mixer. A new high-speed mixer designed for complete mixing of heavy paste materials as well as light powders and creams has been perfected by Excelsior Industrial Corp. (130 Broad Ave., Fairview, Bergen County, N.J.). Other features claimed for the unit: choice of various blades for different mixing jobs; simple or jacketed bowl; tilting cover for easy blade removal.

•

Power Amplifier: Hevi-Duty Electric Co., a division of Basic Products Corp. (304 Hart St., Watertown, Wis), has reportedly developed the first truly proportional power system made in America. The system, H-DEC says, can be used to control any mechanical or electrical process requiring a proportional power curve (e.g., the system was used in a glass melting unit for a year to control 2500 F temperature within 0.2 degrees).



Foreground: one of three 2500 hp Cooper-Bessemer GMWA-10 nitrogen compressors at Keyes Helium Plant. Background: one of three 2000 hp GMWC-6 gas compressors. Engineer-constructor of Keyes Plant was The Fluor Corporation, Ltd.

How U.S.A. puts the squeeze on its helium

The job of extracting helium from natural gas is a low-temperature process in which compression plays a key part. And that's where Cooper-Bessemer horsepower comes in . . . in a big way.

At our country's two principal existing helium plants —the Exell Plant near Amarillo, Texas, and the Keyes Plant at Keyes, Oklahoma—Cooper-Bessemer gas engine compressors play key parts in both of the basic, heavy-duty compression operations for helium extraction...compressing nitrogen for refrigeration and boosting pressure of natural gas for return to supply lines.

At Exell, built during World War II and expanded in 1956, ten C-B compressors total 8,800 hp.; at Keyes, completed in 1959, six total 13,500 hp. All of the Cooper-Bessemer units in both plants are giving reliable service, 'round-the-clock in the production of this highly important inert, lightweight gas for industry and the U. S. defense program.

Call our nearest office for information on C-B products for *your* compression and power facilities.

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GENERAL OFFICES: MOUNT VERNON, OHIO

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Which of these 2 Hercules water soluble polymers meets your needs best?

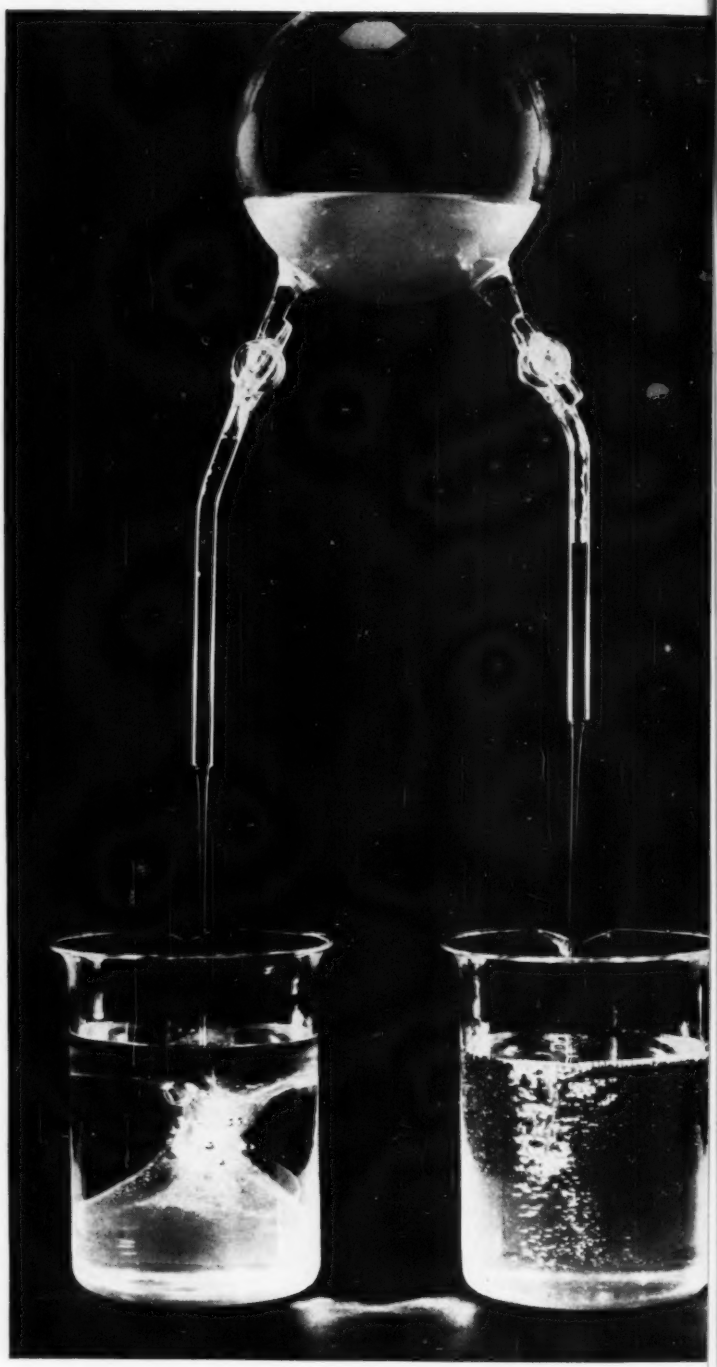
Hercules® CMC sodium carboxymethylcellulose reacts with aluminum ions to produce a wide range of gel characteristics from soft to a rigid gel.

Natrosol® hydroxyethyl cellulose, on the other hand, is inert to cations as the test on the right indicates. In the presence of even a relatively high concentration of alum the Natrosol solution remains smooth, clear and free-flowing, and has no tendency to gel even on heating to the boiling point.

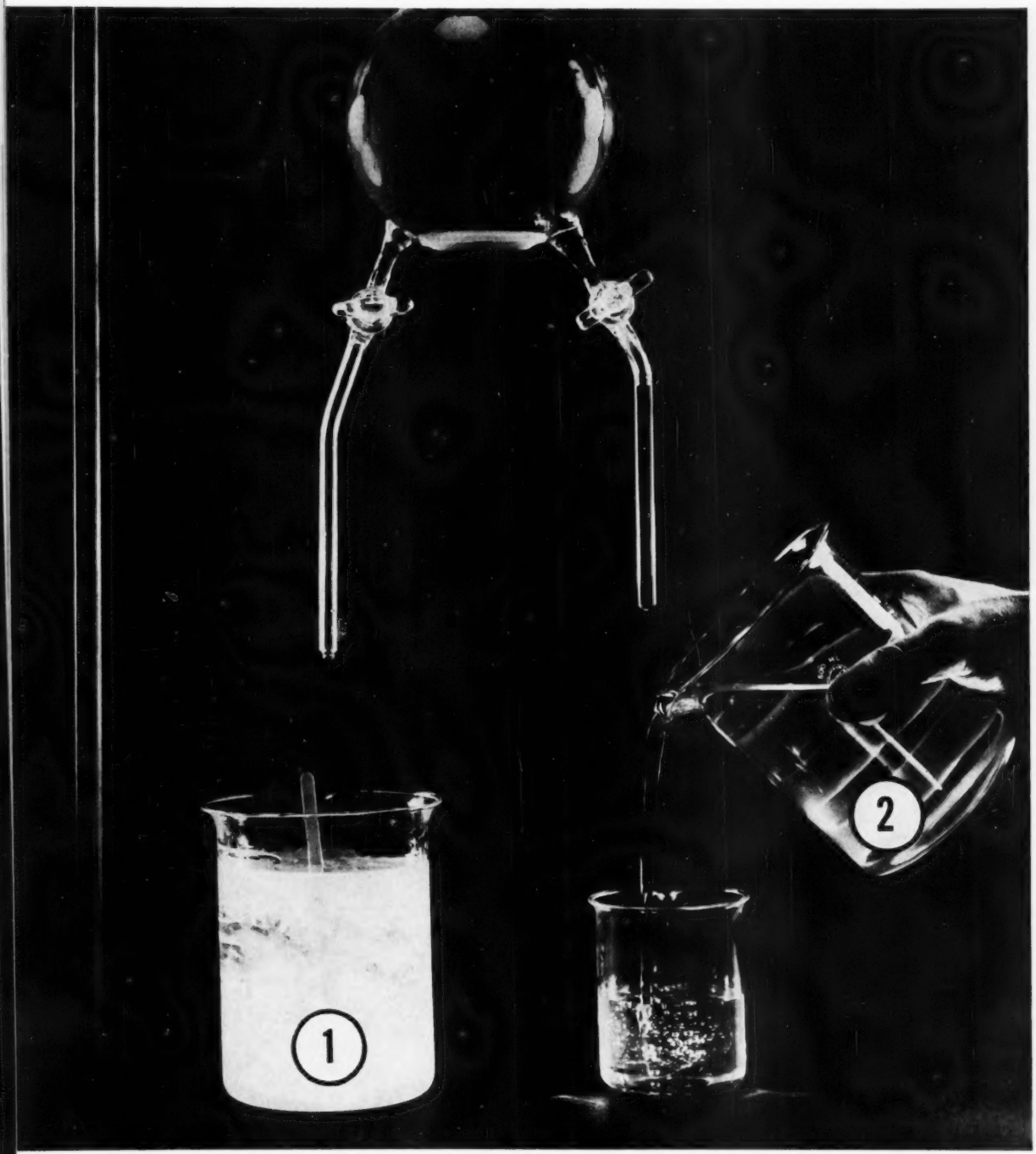
Result: A choice of water soluble polymers to meet a wide variety of needs.

CMC is offered in a wide range of grades for those who may require a thixotropic or nonthixotropic type, need a variation in viscosity, degree of substitution, particle size or solubility. Natrosol is available in four viscosity types to suit it for use as a thickener, protective colloid, binder or film former.

Both CMC and Natrosol are superior to other water soluble polymers in many uses, resulting in an ever increasing number of applications over many different fields. Possibly they offer the answer to one of your own problems. Full technical data on both CMC and Natrosol are available from Hercules to help you in evaluating their usefulness in your own formulations. Why not send for this information now?



Flask holds a 10% alum solution. Left hand beaker contains 1% Hercules CMC. Right hand beaker contains 1% Natrosol. Alum solution is permitted to run slowly into both the CMC and Natrosol solutions. Note gel starting to form in the CMC beaker as the cation concentration increases.



1 **THE CMC** has formed an almost rigid gel, capable of holding a stirring rod upright. CMC should be specified where a thickening characteristic is desired.

2 **THE NATROSOL** solution in the upper right hand beaker remains smooth and free flowing . . . making it the choice of users who require this alternate property.

HERCULES POWDER COMPANY
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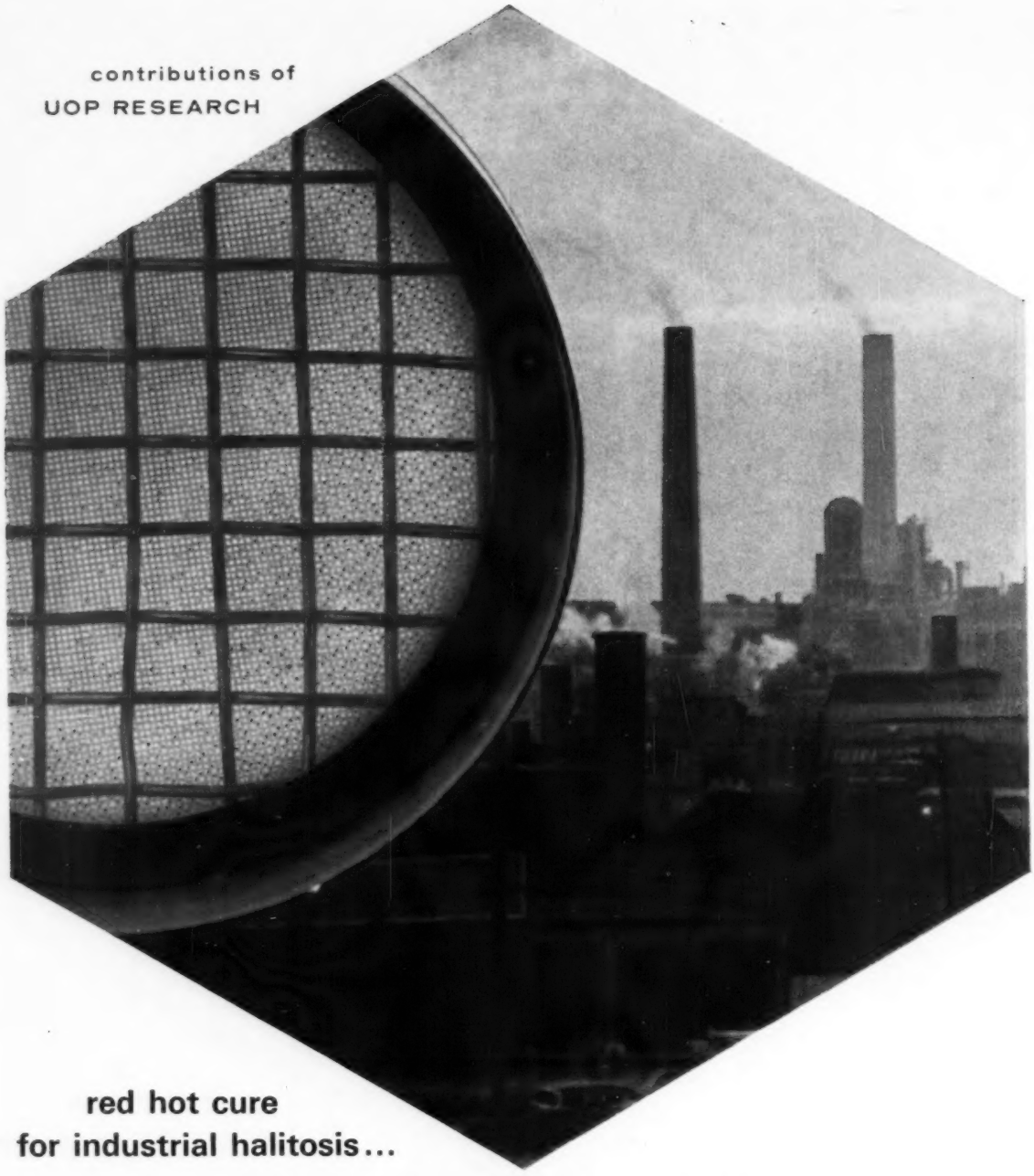

red hot cure for industrial halitosis...

Today's cities are plagued with by-products of industrial progress. Smog, air-contamination, offensive odors . . . UOP research strives for solutions to these growing nuisances.

The glowing screen above is one result of this research. This is the key element in a fume-control system developed by a UOP subsidiary, Catalytic Combustion Corporation. It eliminates odorous organic wastes by low temperature, flameless combustion. Often these odorous fumes can be turned into profit-making fuels for processing, plant heating or other applications ...so that industries can actually turn offensive smells into profit dollars.

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WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

Market Newsletter

CHEMICAL WEEK
September 16, 1961

The polystyrene pricing situation seems headed for a stalemate as producers wait to see who will be first to react—for or against—Rexall's 1¢/lb. price increase that put the firm's bulk price for general-purpose resins at 17.75¢/lb. and bagged crystal at 19¢/lb.

Even if a general price hike develops, it may not stick. Some polystyrene marketers—admitting at least the possibility of an industry-wide try at boosting prices—nevertheless figure the increase wouldn't last long. As one observer puts it: "The market is hopelessly soft, and major producers in particular are stuck with high-cost, expensively instrumented plants." Upshot: since these producers need to keep resin moving into markets, any real show of consumer resistance to the increased prices could soon knock the props from under the price boost.

Much depends on how seriously polystyrene buyers view the warning by Carl Setterstrom, Rexall's marketing vice-president, that "not even such a well-established polymer as polystyrene can grow without strict quality control, the development of new uses and further product improvement. Suppliers will not be able to continue such services at present price levels." The price increase, concludes Setterstrom, is "to the advantage of the ultimate consumer."

This effort to justify higher polystyrene prices echoes sentiments of Dow Chemical, which used nearly identical arguments when it tried to increase prices earlier this year. But Dow had to lower its prices when other producers refused to go along with the boost (*CW, Jan. 7, p. 31*).

Late last week major producers were hinting that if "the other big fellows" play the price game Rexall's way "we may give it a try too." But tenor of the thinking seems to be that increases would be considered highly experimental—and no one would be surprised at failure to hold a higher line.

At least one polystyrene producer seemed to have no problem deciding which way to go. Brand Plastics (Willow Springs, Ill., near Chicago) says it has no intention of raising polystyrene prices at this time. Obvious reason: newcomer Brand just came onstream with a 30-40-million-lbs./year plant (*CW Market Newsletter, Aug. 12*); raising prices now wouldn't help its chances of winning a share of the current soft polystyrene market.

•

A new polyvinyl chloride packaging film is being produced by Borden Chemical at its Andover, Mass., plant. The clear, nonfogging film (Resinite VF-70) is aimed initially at retail packaging of fresh fruit and vegetables and other food items. Price: 69¢/lb. The 0.00075-in. gauge provides 28,700 sq. in. of film per pound. Additional film types in

a broad range of thicknesses are being developed and will be brought out soon.

•

Another trichloroethylene marketer has increased prices. Hooker Chemical last week said it would join other producers in boosting tabs ¾¢/lb. Du Pont initiated the move recently (*CW Market Newsletter, Sept. 9*). Some competitors went along promptly—others, including Hooker, took a little more time to decide, apparently waited to see if Du Pont could make the hike stick.

•

Penn-Olin Chemical's new sodium chlorate plant at Calvert City, Ky., is onstream. Output of the 26,000-tons/year unit will be aimed largely at pulp and paper uses in Southeastern states. The company figures it has enough capacity to fulfill anticipated needs of the market for several years to come. (This is the first venture by Penn-Olin, which was formed jointly by Pennsalt Chemicals Corp. and Olin Mathieson Chemical Corp., an arrangement that's being challenged by the Justice Dept. in an anti-trust suit.)

•

Distillers Co. Ltd. (England) has cut polyethylene prices in domestic and export markets 10-15%, depending on grade, color and quantity ordered. Prices now range from 30 to 42¢/lb. Reductions on Rigidex high-density PE: filament grades, 1½¢/lb.; bottle grades, 3¢/lb.; molding grades, 4¢/lb.

The sizable reductions probably reflect expectations that third-quarter plastics sales in Britain will decline from record sales in the second quarter because of impact of the government's new austerity measures (*CW Market Newsletter, Sept. 9*).

•

Enjay's price cuts on polypropylene specialty resins brought its heat- and age-resistant grades, Escon 125 and 522, down to 42¢/lb. (price of general-purpose resins) in 20,000-lb. lots. The move follows cuts a few months ago by Hercules (its 6512 grade) and AviSun (its 1041 and 1044) on similar types of plastic. Most of the other producers in the field lowered prices some weeks ago. Manufacturing savings are credited with permitting the cuts.

AviSun incidentally, has introduced four new grades of high-impact materials (3216, 3211, 3116 and 3210) at the usual prices for specialty resins—in the 44-46¢/lb. range.

•

Canada has a new polyolefin packaging film maker—TCF of Canada, Ltd. (Cornwall, Ont.). The company, manufacturer of cellulose films, has been distributing AviSun film, will begin immediately to produce its own.

CHEMICALS OUTLOOK

September, 1961

This bulletin is published to keep you posted on Wyandotte key chemicals, their applications, and the many services Wyandotte offers. You may want to route this to interested members of your organization. Additional information and trial quantities of Wyandotte key chemicals are available upon request . . . may we serve you?

NEW, EFFICIENT FLUID THICKENING AGENT

Wyandotte's PLURACOL® V-10 is a new product developed specifically for improving the viscosity of glycol-water type, fire-resistant hydraulic fluids. It is a high molecular weight, liquid polyoxyalkylene polyol with an extremely high viscosity.

This high viscosity is PLURACOL V-10's outstanding physical property. The viscosity of other fluids can be increased by the addition of the V-10. It has excellent resistance to shear and will not hydrolize or degrade under most conditions. If the other solvents are evaporated from the fluid system, it will not deposit waxy residues or solids because it contains no wax. It cannot precipitate or gum up mechanical equipment.

The high viscosity and compatibility with other chemicals and solvents suggests many other uses for PLURACOL V-10. For example, since it is non-carbonizing and non-gumming when subjected to high temperatures, it is an excellent thickening agent for fluid systems that come in contact with hot surfaces. It is non-volatile and thermally stable below 450°F. PLURACOL V-10 is non-corrosive and not subject to bacterial action, making it ideal for metal working fluids. Additional information and recommendations for use are available on request.

CALCIUM CHLORIDE USED IN LEAD & TUNGSTEN REFINING

Although it's not used in conventional lead processing, calcium chloride is an important factor in the removal of bismuth in lead refining. Calcium chloride serves as a cover slag limiting the oxidation of calcium carbide and magnesium metal, which are added to the lead bath as a collector of the bismuth. The calcium carbide decomposes, enters into, and helps to form a calcium-magnesium-bismuth complex including some calcium chloride from the slag cover. The debismuthized lead is syphoned from below the complex calcium-magnesium-bismuth dross. This is followed by removal of the dross. In practice, a large part of the calcium chloride is skimmed off and lost with the bismuth dross.

In the reduction of tungsten compounds to metal, calcium chloride is used at times as an admixture before hydrogen reduction. There are indications that the use of calcium chloride in hydrogen reduction of tungsten will produce a powder which yields better metallurgical results when converted into ingots or sinter.

If you have any questions about these or other Wyandotte products, or questions about their applications, write to us on your letterhead. For prompt attention, be sure to address Department CO.

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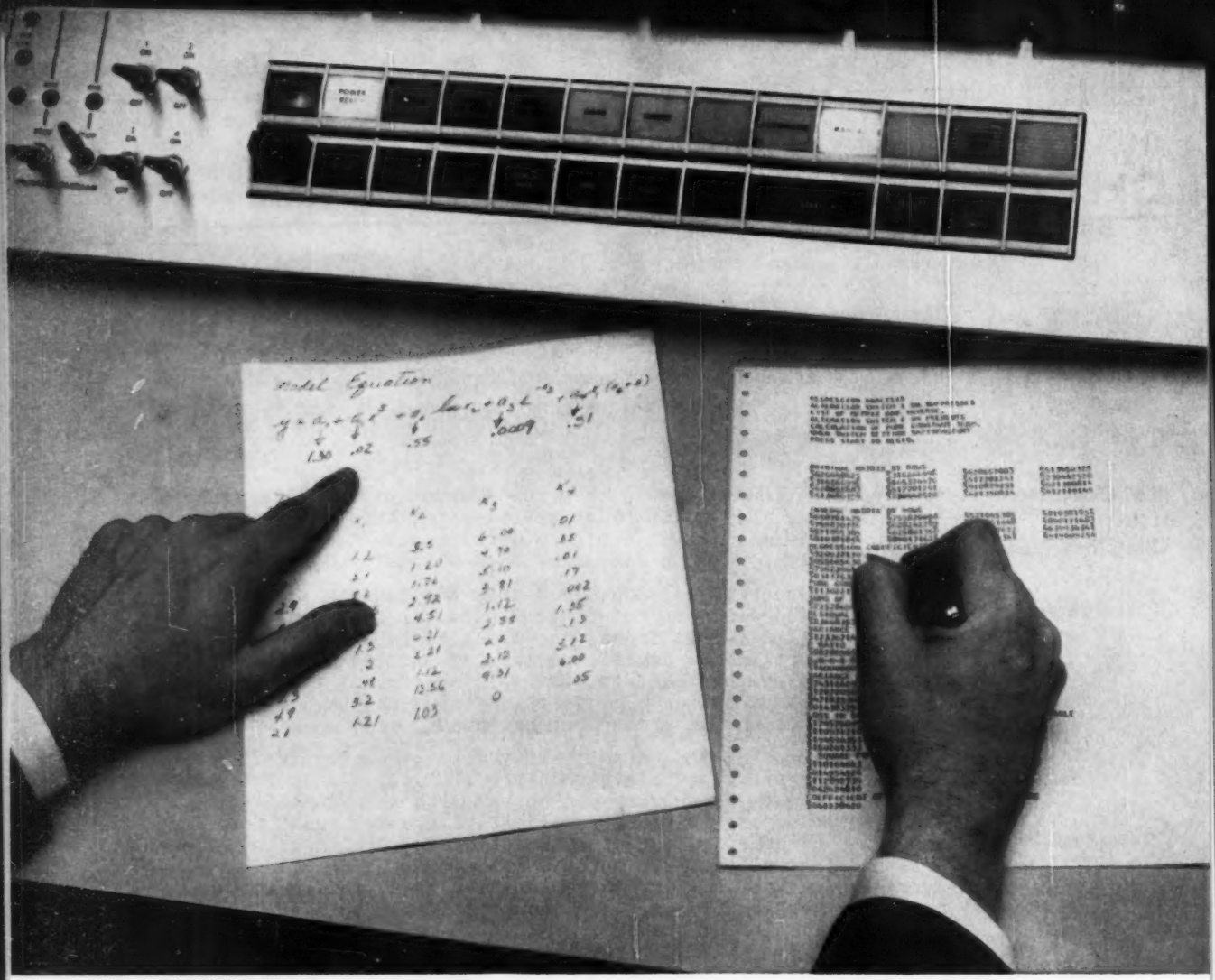

Want to find the coefficients? It's easy with the new Regression Analysis program for the IBM 1620

Here's another program offered free-of-charge to users of the IBM 1620 Data Processing System. It gives you the kind of results you might expect only from a much more expensive computer. But users of the 1620 know that its low rental cost is deceptive. The 1620 packs *more computing power per cubic inch* than any other computer in its size range.

The Regression Analysis program is a good example. Suppose you want a fit for production purposes. If you employ more than two variables you probably have difficulty visualizing the representation of your data. If linearity is not the case, you must often guess blindly at a polynomial of high degree, accept or reject the fit with something approaching a sixth sense, and either try again or settle for the results you have.

The new Regression Analysis program lets you handle expressions containing up to *24 variables*. If you have the even more complicated task of handling many dependent variables, the program will generate regression coefficients with a maximum number of dependent variables not exceeding one-half the number of independent variables.

This program will also fit non-linear functions and hyper-surfaces. Compare this performance with that of any other computer in the 1620's price range.

A basic 1620 installation rents for just $1600 per month. For details, contact your local IBM Representative.

IBM's 1620 is a compact desk-size computer.

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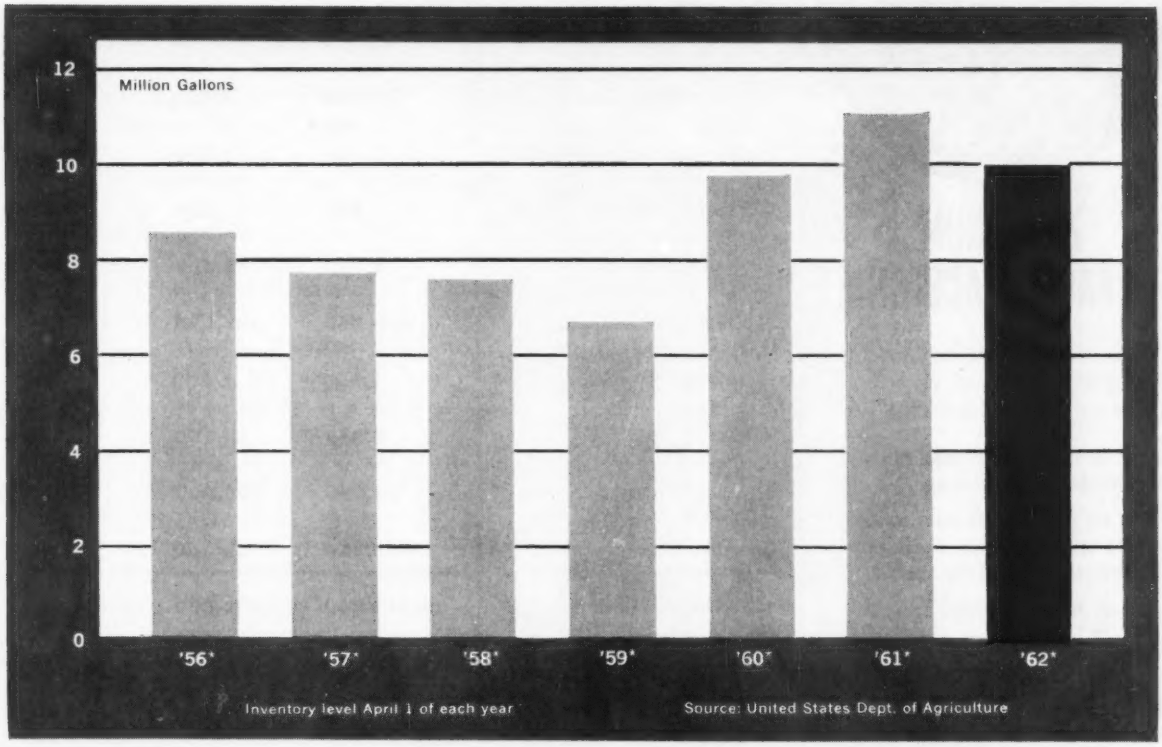
DATA PROCESSING

Turpentine inventory: drop-off in prospect



Cheap Turpentine Brightens Use Outlook

Against a background of the lowest price in 20 years—25¢/gal.—and a depressed export market, turpentine producers are looking forward to better times. New data from the U.S. Dept. of Agriculture, which indicates fiscal '61's usage will be about 1.3 million gal. above the '60 mark, is helping build confidence; and a new drive to develop chemical markets (using turpentine components as chemical intermediates) is also lifting hopes.

There is still a marked oversupply of turpentine. But inventories are likely to be down to about 10 million gal. by next April—about 600,000 gal. less than the April '61 level (*see chart, above*). Part of this inventory reduction will be due to trimmed output—and part to expected increases in sales to industry (a domestic demand pickup of almost 3 million gal. is expected during fiscal '61-'62).

Tempting Price: The 25¢/gal. price is behind some of the newly awakened interest in turpentine as an intermediate, although the retail thinners market was affected more strikingly. As recently as last April turpentine was priced at 50¢/gal., and moving slowly. The sharp cut quickly brought a rise in retail demand; its effect on intermediate usage is still hard to determine.

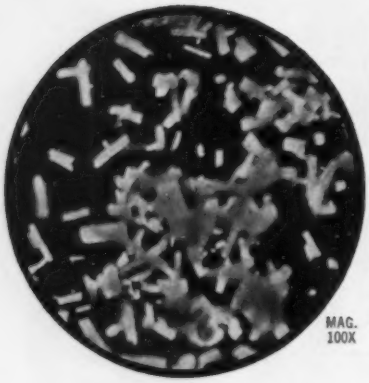
The market-stimulating new price applies generally to all three basic types of turpentine* (they are somewhat interchangeable products). Gum turpentine, the oldest known, and usually the highest priced, is now in the same price range as the wood-distilled and refined materials. Sulfate turpentine, a by-product of sulfate process kraft paper operations, however, is by far the most abundant product, and it is most widely used as a chemical intermediate.

*The average composition breakdown of the three turpentines: gum turpentine—60-65% α pinene, 25-35% β pinene, other terpenes 5-8%; wood-distilled—75-80% α pinene, camphene 4-8% and other terpenes 15-20%; sulfate turpentine—α pinene 60-70%; β pinene 20-25% and other terpenes 6-12%.

The intermediate applications of turpentine currently have far more market significance than do the solvent uses. Although some 15.3 million gal./year of turpentine thinners were sold in the mid-50s, demand is now in the 5-6-million-gal./-year area. And since sulfate turpentine is less desirable as a thinner because of odor, the gum- and wood-distilled products largely have this market, while the sulfate product goes into industrial applications.

During fiscal '60-'61, approximately 19.1 million gal. of turpentine went into chemical derivative manufacture. And now the push is on to rapidly expand the chemical derivative segment of the turpentine market with a new end-use development program combined with more active promotion of established end-products.

Pine Oil Promotion: Hercules Powder, for example, recently set up the Pine Oil Information Center to pro-



ZIRCONIUM TETRAACETYLACETONATE

A newly available colorless, crystalline solid offering two distinct advantages over previously used Zirconium Tetrachloride.

For the cross-linking of polyol, polyester, polyalkoxy and similar resins.

For the preparation of zirconium alkoxides by the reaction of Zirconium Tetraacetylacetonate with alcohols.

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COMPOUNDS AND CHEMISTRY

Turpentine End-Uses

(Gallons)

	'54-'55*	'59-'60*	'60-'61*
Chemical and pharmaceutical	10,977,900	20,304,450	19,105,100
Adhesives and plastics	3,150	3,050	2,750
Foundry and foundry supplies	7,450	2,800	2,600
Insecticides and disinfectants	400	300	300
Oils and greases	4,700	10,400	9,000
Paint varnishes and lacquers	398,850	235,650	208,350
Printing ink	7,000	3,250	1,600
Rubber	5,950	17,750	39,850
Shoe polish and shoe material	85,950	106,200	86,300
Other industries	126,650	12,150	10,150
INDUSTRIAL TOTAL	11,618,000	20,696,000	19,466,000
EXPORTS	5,793,000	3,094,000	408,750
RETAIL	15,287,000	5,740,500	6,607,500
GRAND TOTALS	32,698,000	34,530,500	30,161,000

* Year April 1 to March 31. Source: U. S. Dept. of Agriculture.

mote the use of pine oil—the single most important terpene chemical derivative (taking about 6.5 million gal./-year of turpentine). This organization, said to be budgeted at "several hundred thousand dollars/year," is concentrating efforts on the consuming public, touting pine oil's cleansing and disinfecting properties. Although it may still be too early to determine quantitatively the effects of the program, various industry sources cite an increase in pine oil business during recent months.

In addition, the other major turpentine derivative applications are expected to register significant market gains during the next several years. Outlook for toxaphene, a chlorinated insecticide based on terpenes, is good, and some of the new derivatives now under development are expected to bolster sales soon.

The only bleak spot in turpentine's future seems to be exports. This market is expected to slip slightly to about 3.5 million gal.—down 0.5 million—during fiscal '61-'62, according to USDA. Growing turpentine output overseas is the main reason for this decline.

By-product Problems: The turpentine excess has been largely brought about because of the by-product nature of this material. Its availability is determined by the demand for rosin and kraft paper and not by the market demand for turpentine itself. The gum- and wood-distilled material is a by-product of gum and wood rosin production, while the sulfate material results from kraft pulping. Availability of turpentine from these three sources differs radically. In both the short- and long-term future, gum and sulfate turpentine output will likely advance rapidly, while wood-distilled turpentine production should

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*By Mark N. Rerick, Univ. Notre Dame

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Turpentine Supply

(Thousand gallons)

	Production			Imports	Total
	Gum	Wood Distilled	Sulfate		
'54-'55	8,797	10,506	11,587	768	31,658
'55-'56	7,450	10,129	15,149	804	38,581
'56-'57	7,192	9,790	15,266	1,189	33,410
'57-'58	6,454	9,299	15,588	719	32,060
'58-'59	6,015	8,630	15,767	1,108	31,520
'59-'60	5,370	8,798	17,670	772	32,610
'60-'61	5,948	8,144	16,147	714	30,952
'61-'62	7,000	7,000	16,150	700	30,850

Turpentine Demand

(Thousand gallons)

	Industrial	Retail	Exports	Total
'54-'55	11,618	15,287	5,793	32,698
'55-'56	16,753	11,950	5,099	33,802
'56-'57	16,545	11,462	6,258	34,264
'57-'58	19,383	8,872	3,973	32,228
'58-'59	20,795	7,959	3,626	32,380
'59-'60	20,696	5,741	3,094	29,531
'60-'61	19,466	6,608	4,087	30,161
'61-'62	27,950		3,500	31,450

Source: U. S. Dept. of Agriculture.

continue downward. Over-all, turpentine will be in abundant supply.

Wood-distilled turpentine production has been consistently declining for several years. During fiscal '61-'62 production will probably slip to about 7 million gal.—a 3.5 million gal. drop from the '54-'55 production level. By '65, production will probably decline to half the current level as a result of a diminishing supply of raw material—old (100 years or more) long leaf, slash pine tree stumps. In modern pulping operations, pine trees are cut after 30 years of growth. Stumps of such trees are not suitable for rosin and turpentine production.

At the same time, gum and sulfate turpentine availability is expected to advance. Gum turpentine production since April of this year is already 24% above the similar four months in '60. But the future is largely dependent on rosin price and demand.

Sulfate turpentine's production outlook is more easily pinpointed. During fiscal '61-'62 production should hit about 16.15 million gal.—a 4.6 million gal. advance over the '54-'55 level. And continued growth is expected. According to the U.S. Dept. of Commerce, wood pulp production will register a 30% gain by '65. And sulfate pulping operations are expected to grow even faster, according to a recent survey by U.S. Pulp Producers Assn.

In essence the turpentine market picture is far from glowing at present. But prospects for the current year and the years ahead are good; the problem lies in getting the price back to a level at which producers can find it profitable to expand turpentine usage.

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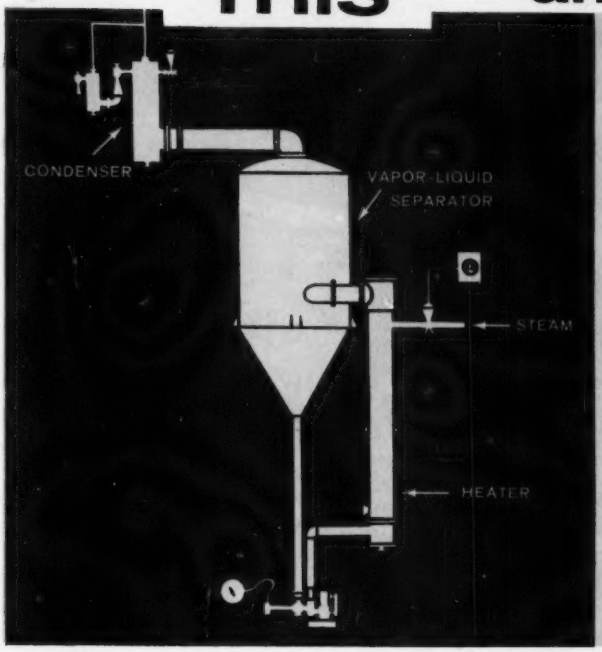

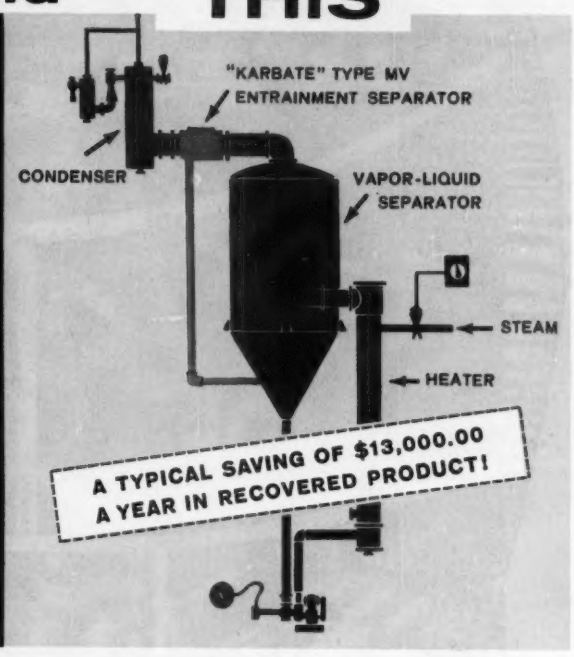

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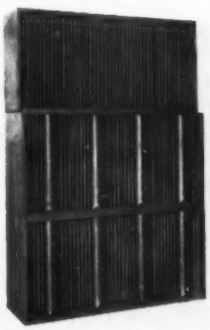

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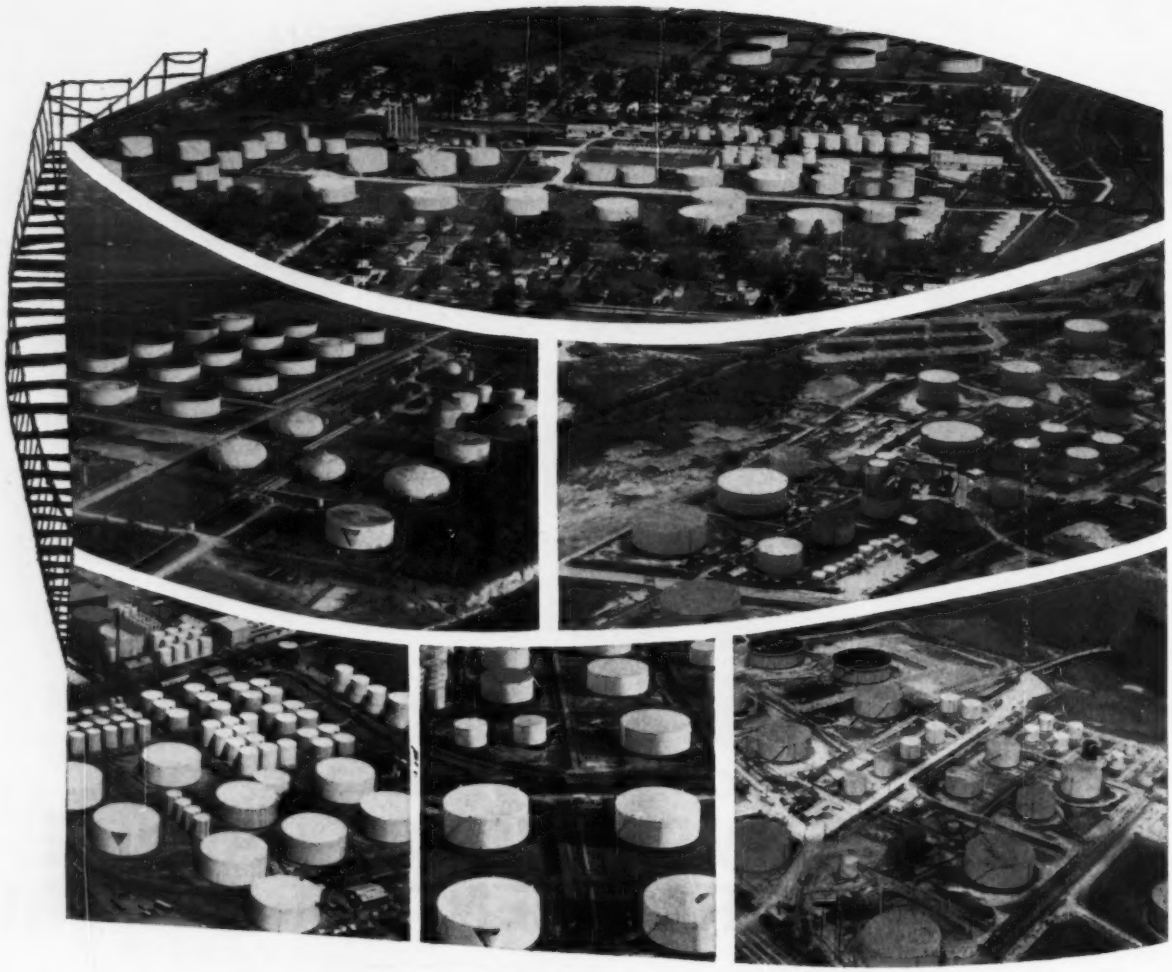

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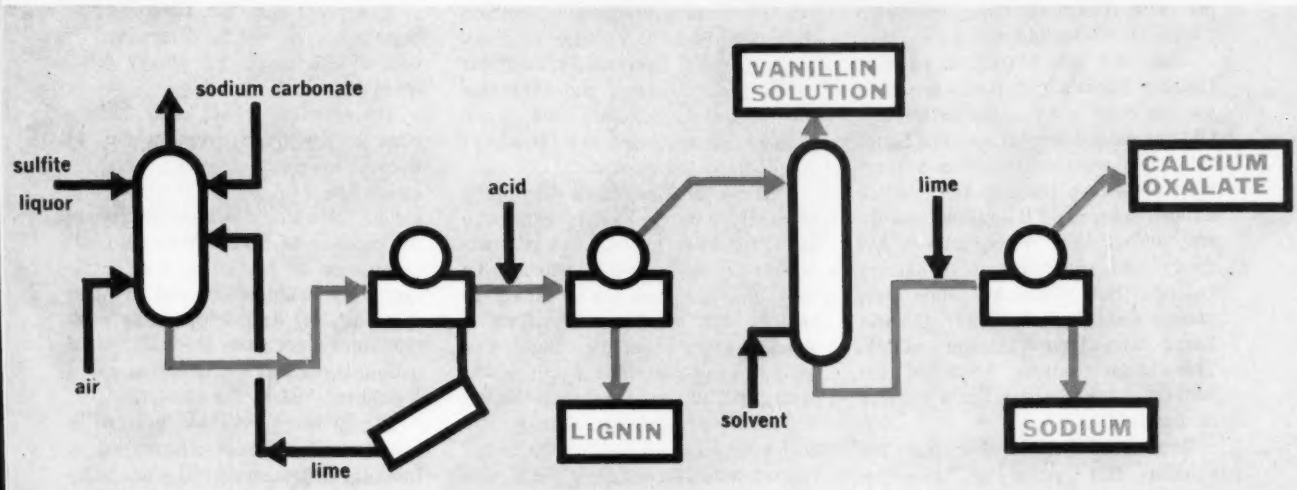
New process adds oxalic, lignin, recovered sodium to list of wood chemicals



By-product Bonus In New Vanillin Process

Expansion work continues this week at Ontario Paper Co. Ltd.'s (Thorold, Ont.) new-process vanillin unit. The new plant has already boosted vanillin production, making Ontario Paper the world's largest producer. It will also yield calcium oxalate (for oxalic acid), lignin, and sodium carbonate.

Details of the process are revealed in two recent Canadian patents (615,552 and 615,553). Although the company recently said that the patents are related to its expansion, it won't say which parts are in effect.

But the patents indicate that the new plant might be able to turn out ½ lb. of calcium oxalate, 5 lbs. of lignin and 25 lbs. of sodium sulfite for each pound of vanillin. Based on current vanillin output (1.5 million lbs./year), this could bring its annual production to 700,000 lbs. of calcium oxalate, 7.5 million lbs. of lignin and 19,000 tons of sodium sulfite.

Key—Lime plus Leaching: Heart of the new process is a novel reactor with many features of an older Ontario Paper process (Canadian patents 483,827 and 483,828). In this reactor, spent sulfite liquor feed is air-oxidized with additions of lime and of sodium carbonate. The complex chemical reactions induced have three simultaneous results:

(1) The action of lime and oxygen brings vanillin into solution out of the sludge in the spent liquor feed.

(2) The sodium carbonate solution brings additional vanillin and acetovanillone into solution as well as calcium oxalate and lignin, leaving a solids consisting almost entirely of calcium carbonate.

(3) Oxidation, in combination with the sodium carbonate addition, improves the filtering properties of the calcium carbonate solids so that they are easily separated from the chemical-containing solution.

In the process, slaked lime, sodium carbonate solution and air are added through separate lines during continuous agitation. (At Ontario Paper's Thorold plant, the sulfite liquor is first treated to remove saccharides for fermentation to ethyl alcohol, but this pretreatment is not necessary.) Lime addition is gauged by observing the effluent slurry, which turns from white to tan when calcium concentration is too high. Sodium carbonate is added to hold the pH at about 12. And air pressure is held to less than 10 lbs./-sq. in. gauge.

During the reaction, temperatures are kept at about 350 F, while the hold-up time is regulated to about two hours, depending on other conditions.

Separation Starts: From the reactor, the slurry passes to a primary filter, where calcium carbonate is removed for calcinating and recycle. Sulfuric acid is added to the filtrate to drop the pH from about 12 to about 4, at which point the lignin precipitates. This lignin is filtered out; and vanillin and acetovanillone are extracted from the filtrate with one of a variety of solvents (benzene, toluene, butanol, etc.).

After the vanillin compounds are extracted, lime is added to the solution until calcium oxalate begins to precipitate into a slurry. This calcium oxalate is filtered out. And finally, the sodium values are recovered either as sodium sulfate or sodium carbonate through evaporation and crystallization.

Train of Treatments: Comparing this with Ontario Paper's older process shows that, except for the novel reactor, the new route is largely an extended train of treatments to recover chemicals that were originally burned with the waste sludge. The older process resembles the Marathon process

(that of Marathon Division of American Can Co.), which is used by two other producers of synthetic vanillin in North America, Howard Smith Paper Mills (Cornwall, Ont.) and Salvo Chemical (Rothschild, Wis.).

And like the Marathon process, Ontario Paper's old route dissolved vanillin from a waste sludge through alkaline oxidation with air. The lignosulfonates were subjected to a four-hour cook in a reaction zone, which sufficed to break off the sulfonic groups and replace them with carboxy, hydroxy and other oxygen-containing radicals. But where Marathon uses caustic soda for alkalinity, Ontario Paper uses lime (calcium oxide). This route recovers 7-8% of the vanillin, based on the lignin content of the feed.

Because of the limited markets for vanillin this percentage recovery was deemed sufficient for economical operation during the '50s. And it appears doubtful that Ontario Paper would have boosted vanillin production in '59 if it could not come coincidentally with the availability of other chemicals. Now, by disclosing that its expansion is related to the new patents, it has revealed that increased vanillin output depends on the original alkaline oxidation supplemented with sodium carbonate leaching.

Combine or Separate? The patents describe two alternate routes, however, and the route in actual operation has not been disclosed. Basically, these routes are:

- Leaching the sludge resulting from the original vanillin process. Treatment, at about 160 F, with sodium carbonate solution—bringing an additional 7-8% of vanillin out of the sludge, along with the oxalic, lignin and sodium values—leaves a refined calcium carbonate sludge that can be calcined to lime and recycled to the oxidation reactor.
- Adding sodium carbonate solution to the oxidation reactor (*as shown in the simplified flowsheet on p. 103*). Since air oxidation improves the separation of the calcium carbonate sludge, and since this route allows combined operation of the old and new processes in the same equipment, it seems the more likely route.

Ontario Paper's reticence about details results from the limited vanillin market. The lignin-based vanillin processes are expected to replace other routes (from eugenol and guaiacol) and to make inroads on natural vanilla. Yet the total continental market is not much more than 2 million lbs./year (now, U.S. price is about $3/lb.). With Howard Smith Paper Mills, Salvo Chemical and Monsanto also producing vanillin from waste pulping liquor, any new producer would flood the market.

Plethora of Chemicals: Obviously, each of Ontario Paper's expansion steps requires an assurance of markets to justify capital investment. To date, the firm has limited itself to vanillin. But oxalic acid production should appear soon, then lignin and sodium carbonate. The lignin is expected to find use as a dispersant, the sodium to be consumed internally. The firm buys an estimated 20,000 tons/year of soda ash.

But despite the limited market for many wood-derived chemicals, the pressure to extract them from waste pulping liquor continues. The raw material is readily available; over 50% of the tree goes into the waste liquor. And this liquor contains: lignin sulfonates, 55-65%; sugars, 15-22%; sugar sulfonic acids, 5-8%; calcium as lime 7-10%; and sulfur as sulfur dioxide, 8-12%. Many of these components give chemicals whose uses have yet to be explored (*see p. 106 for a possible lignin market*). But Ontario Paper's process is a route to some chemicals with established markets—and it may help develop markets for others.

More on Fluohmic

New details are available on the hydrogen cyanide process recently made available for license by Shawinigan Chemicals Ltd. (Montreal) through The Lummus Co. This process is the first application of Shawinigan's noncatalytic reactor, tradenamed Fluohmic, which employs heat-conductive particles to bring gases to their reacting temperature.

Using either alternating or direct electric current as the energy source, Fluohmic is said to be applicable to a wide range of chemical processes that require rapid heating to high temperatures in an endothermic reaction. In addition to its hydrogen cyanide process, Shawinigan has patented processes using the Fluohmic furnace to make titanium tetrachloride (an intermediate to titanium dioxide), to desulfurize coke, to make carbon disulfide, etc.

It appears that the economics of these processes will be determined by cost of the source of energy (electrical or other).

The new reactor will likely find application in those areas where an over-all saving is realized through its claimed advantages—e.g. (1) higher yields, (2) wider choice of feedstocks (no catalyst to be contaminated), (3) elimination of oxygen (it may be required for combustion heat in other methods), (4) flexible operating rates that can be cut to as low as 25% of design, depending on maintenance of a fluidized bed in the reactor.

The hydrogen cyanide process illustrates all of these advantages. A Lummus-built commercial plant using the process has been operated by Shawinigan since last year. Experience with this unit and with Shawinigan's pilot plants has shown that raw material and energy consumption for each pound of hydrogen cyanide are about 0.64 lbs. of propane (or its equivalent of natural gas), 0.74 lbs. of ammonia, and 2.7 kilowatt hours of electricity. Along with the hydrogen cyanide, by-product hydrogen (about 38 standard cubic feet, 98% pure) is also produced. Yields of 85-90% hydrogen cyanide, based on ammonia or hydrocarbon feed, are reported.

Carbon pellets are the only successful heat-conducting material so far discovered for use in the reactor. These pick up heat from permanent carbon electrodes and in turn heat the gases. Two general types of the reactors are described in Shawinigan patents: (1) the electric energy input is made directly into the reacting zone where the pellets are fluidized by the reacting gases; (2) the heating and reacting zones are separated by a transfer line, with the pellets fluidized around the electrodes by an inert gas such as nitrogen.

A side effect of the electrical energy source yields certain unexpected dividends. Although a catalyst is not used, it nevertheless appears that the electric current affects the coke pellets (perhaps through surface ionization) so that actual yields are above those expected theoretically.

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Wood-Derived Tires

The Canadian Army and Canadian National Research Council (NRC) are touting some new developments in rubber compounded with lignin, by product of wood pulping.

The Canadian military team claims lignin tires (all the carbon black is replaced by lignin and all but 12% of the natural rubber is replaced by SBR) had equivalent wear but less resistance to cutting and chunking than ordinary tires. These properties, the team adds, apparently can be improved.

NRC reveals that it has made two important developments in processing lignin rubber: (1) use of a new temperature manipulation technique to improve coagulation; (2) use of a new retardant (Wyandotte's Quadrol, a polyhydroxy amine) to simplify the problems of vulcanization and curing.

Less Strategic Material: Interest in lignin tires is fired by a desire to make military tires independent of strategic materials. Possibilities for commercial lignin tires, however, are still vague. Nevertheless, at roughly 6¢/lb., lignin offers a marked price advantage over carbon black's 1.8), also indicates specific gravity (1.3, compared with carbon black's (1.8), also indicates that a lignin tire might require 6% less rubber.

Curd Coagulation: But lignin's future as pigment for reinforcing rubber —and that of carbon black for which lignin might be substituted—depends on the processing. Today, operating difficulties are the major drawback to lignin's use. Whereas carbon black is easily dry-milled into the rubber stock with existing machinery, lignin must be mixed in by coprecipitation. Latex and lignin are blended in an aqueous solution, then coprecipitated with sulfuric acid.

Coagulation of the lignin masterbatch after this coprecipitation has been the main difficulty. The product is a slimy curd, carrying a lot of water, so that processing in existing SBR rubber lines has been next to impossible. Polymer Corp. of Canada, for example, found that its normal production was reduced to 25% with the lignin masterbatch.

NRC claims that its temperature manipulation technique has overcome the problem of water retention in the precipitated curd, but details of this process are secret (patents have been applied for). This prospect, plus the simplified curing and vulcanizing gained from Quadrol in improving lignin tires' resistance to cutting and chunking, makes lignin at least a possible contender for the tire pigment market.

Vanadium Boost

Production of high-purity (99.5%) vanadium pentoxide is under way in a plant at Garfield, Utah. A joint venture of Susquehanna Western Corp. (Denver), Minerals Engineering Co. (Grand Junction, Colo.) and FMC Corp., the unit has been modified from an existing cobalt refinery. Feed material is the fused slag from FMC's Pocatello, Idaho, elemental phosphorus plant.

While the Garfield unit reportedly uses a new process (details are still secret), production of vanadium from Western phosphate ores is not new. Prior to '59, Anaconda Copper produced about 250,000 lbs./year of 86% vanadium pentoxide as part of its trisuperphosphate operation at Anaconda, Mont. Since then, Anaconda has dropped out of this business.

The backers of the new venture expect the vanadium-bearing phosphatic ores of the Intermountain West to become a major source of vanadium. Currently, vanadium pentoxide is recovered as "red cake" (86-87% vanadium pentoxide) from uranium processing on the Colorado Plateau. The red cake, essentially sodium vanadate, contains iron and sodium impurities, is used in open hearth furnaces for making vanadium steel alloys.

In contrast, the high-purity vanadium pentoxide from the Garfield plant may be processed into 99.99% pure ductile vanadium metal. As such, it is expected to find increasing use as an alloy with titanium, molybdenum, tungsten, chromium, columbium and even uranium.

The plant has expected capacity of 1 million lbs./year. And since there are billions of tons of Western phosphate ores containing 0.10-1.0% available vanadium pentoxide, the new process may represent an important change in vanadium supply.

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PROCESSES

Ultraviolet for Ultrapure: Breaking metal-to-chemical bonds with ultraviolet light is the key to a novel process for making ultrapure metals. The process, developed by Arthur D. Little, Inc. (Cambridge, Mass.), involves: (1) formation of a metallic compound, (2) purification of the metallic compound by distillation and (3) recovering metals from the purified compounds by breaking the chemical-metal bonds. For example, mercury is purified by forming diethylmercury, distilling the diethylmercury, and breaking the mercury-to-carbon bonds with ultraviolet light.

•

PERT Planning: RCA is now offering free to users of its RCA 501 Electronic Data Processing System, a program for the PERT method of scheduling and controlling projects. PERT (Program Evaluation Review Technique) is an adaptation of the systems engineering method used by the Navy and Air Force for administering their large-scale development programs. It explores relationships between the facets of a project, highlights possible trouble spots, measures uncertainties and simulates courses of action.

•

Bagasse Boards: A new process using chemical binders and a 90-ton hot press will be incorporated into a $2-million plant for the manufacture of hardwood boards from bagasse, a sugar cane by-product. The plant, owned by National Bagasse Products Corp., is under construction at Vacherie, La., will produce boards 5 ft. wide by 20 ft. long and varying from ¼ in. to 2 in. thick. The boards will be marketed by Georgia-Pacific Corp. (Portland, Ore.).

•

Oil for Iron: Egyptian Iron and Steel Co. has signed an agreement with Standard Oil Co. (New Jersey) to use the Esso fuel oil injection system (*CW, July 8, '61, p. 63*) in its blast furnaces. Based on furnace capacities of 800 tons/day, fuel oil consumption will amount to about 200,000 bbls./-year. This is estimated to mean saving of $2 million/year in coke. Since Egypt has native fuel oil supplies, but no coke, the firm plans to push the amount of oil in the furnace burden to about 30%.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

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European Chemical Co. has need for a consul- tant in Metacrylics molding compounds sheets-rods-tubes. We demand Manufacturing-selling and application know-how etc. Contact Havas No. 217/598, Rue Vivienne 17, Paris.

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Salesman wanted for technical selling of broad line of domestic and foreign chemicals. Sales fields include paint, rubber, printing ink, pharmaceutical and chemical trades. Challenging opportunity for ambitious man with chemical education and sales experience who is willing to expend his energy in an organized sales campaign. Location in New York City. Please send complete resume including salary requirements to A. G. Lilla, Naftone, Inc., 425 Park Avenue, New York 22, New York. Replies will be kept strictly confidential.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."

Your Organization-is it complete? Are you ex- panding it? Making replacements? Naturally, you are anxious to secure the most suitable man or men available. You want men with the special training that will make them an asset to your organization. You can contact such men through an advertisement in this Tracers Section of Chemical Week. Classified Advertising Division, Chemical Week, Post Office Box 12, New York 36, New York.

CONTRACT WORK WANTED

Custom Grinding-Ultra Fine or Coarse-Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO_2 installation for Nylon, Teflon and Heat Sensitive Materials. A Cramer Corp., 10881 S. Central Avenue, Box 682 Oak Lawn, Illinois.

Is anyone interested in solvent extracting of filter cake obtained from Vegetable wax refining? CWW-7445, Chemical Week.

PROFESSIONAL SERVICES

The Consulting Engineer. "By reason of special training, wide experience and tested ability, coupled with professional integrity the consulting engineer brings to his client detached engineering and economic advice that rises above local limitations and encompasses the availability of all modern developments in the fields where he practices as an expert. His services, which do not replace but supplement and broaden those of regularly employed personnel, are justified on the ground that he saves his client more than he costs him."

BOOKS

For recovery of precious metals catalysts, solu- tions send for recovery schedule. Precious Metals Recovery Corp., 85 River Road, Nutley 10, New Jersey.

EQUIPMENT FOR SALE

Multi-million dollar chemical plant at North Little Rock, Ark. Stainless Steel & glass-lined equip. Send for detailed circular. Perry, 1415 N. 6th St., Phila 22, Pa.

Pfaudler 1250 gal. blue-glass lined jacketed reactor, 72" x 72", Agit. Perry, 1415 N. 6th St., Phila. 22, Pa.

6' x 150' rotary kiln, ⅜" welded shell, excellent shape. Perry, 1415 N. 6th St., Phila. 22, Pa.

One Ingersoll-Rand Condenser, model #5DF-18. Perfect condition. $750.00 f.o.b. Edison, New Jersey. Including pump and 7½ H.P. motor. Box FS-7447, Chemical Week.

For Sale:—Over 80,000 Gallons A. O. Smith Blue Glass-lined Storage Tanks still erected in closed Newark, New Jersey brewery. Available at once. Arrange for inspection now. For details, contact Frank Boitz in Newark at Bigelow 8-6161 or Bigelow 8-3400 or write c/o P. O. Box 3055, Newark 3, New Jersey.

Opportunities-business; personal or personnel; financial; equipment; etc., may be offered or located through the Tracers Section of Chemical Week. For more information write to: Classified Advertising Division, Chemical Week, Post Office Box 12, New York 36, New York.

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C_8-C_{10} Alcohols (C_8 Av.) Off-grade, low-cost Prime sources large continuous quantities wanted. Send details to W-7391, Chemical Week.

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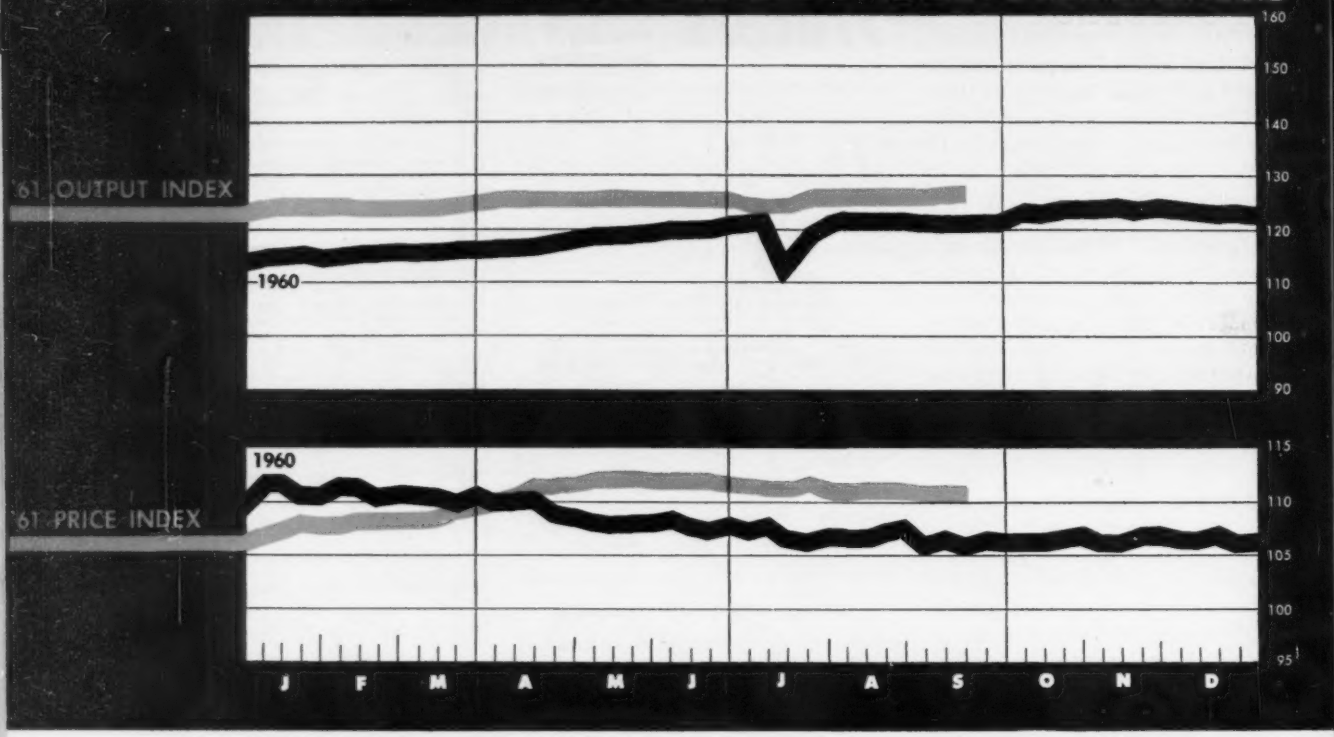
This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division, Chemical Week, P.O. Box 12, N. Y. 36, N. Y. LOngacre 4-3000.

BUSINESS BENCHMARKS



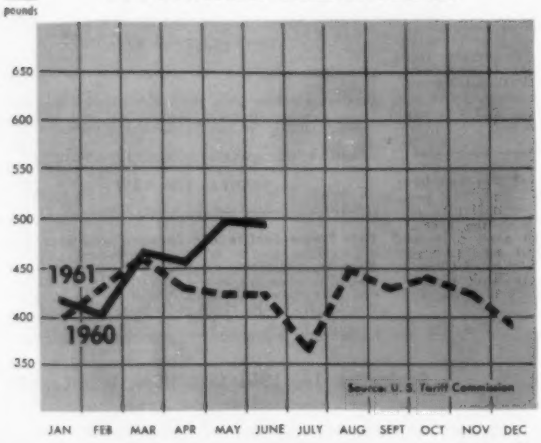
SEPTEMBER 16, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.9	125.5	122.2
Chemical Week wholesale price index (1947=100)	110.4	110.6	106.3
Stock price index (12 firms, Standard & Poor's)	55.85	55.21	47.24
Steel ingot output (thousand tons)	2,030	2,020	1,483
Electric power (million kilowatt-hours)	16,214	15,491	15,353
Crude oil and condensate (daily av., thousand bbls.)	7,051	7,054	6,837

FOREIGN TRADE INDICATORS	EXPORTS			IMPORTS		
(Million dollars)	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	37.4	36.8	33.3	139.6	151.6	142.5
Coal-tar products	8.7	7.4	6.7	13.3	13.9	11.9
Industrial chemicals	15.3	10.8	9.6	25.9	28.4	25.9
Medicinals and pharmaceuticals	3.3	3.1	2.4	22.0	22.0	24.8
Fertilizers and materials	7.4	12.6	11.6	10.8	10.8	9.4
Vegetable oils and fat (inedible)	5.1	6.0	6.5	5.9	3.2	12.1

CHEMICAL CUSTOMERS CLOSE-UP

MANUFACTURERS' SALES OF PLASTICS



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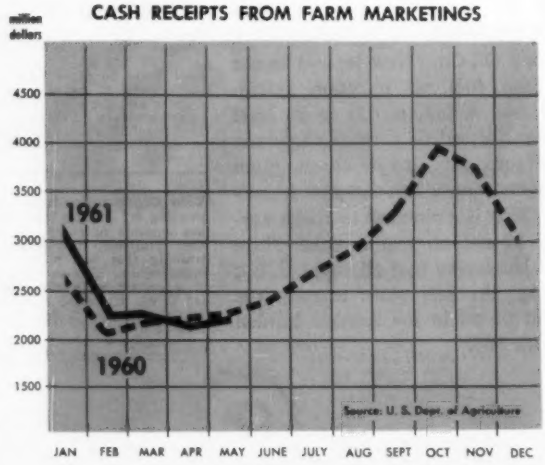

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Add just 6% of Cab-O-Sil to a solvent like turpentine; shake well; and just try pouring it out. Gel sets so fast, you literally defy gravity. Even a lead sinker is immediately and firmly locked in suspension.

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- **Flatting agent** — varnishes, lacquers, organosols, plastisols
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- **Anticaking agent** — sulfur, insecticides
- **Antislip agent**—solvent-base floor waxes
- **Precoating material** — reproduction paper
- **Low temperature thermal insulation**
- **Pharmaceuticals and Cosmetics** — **(See bulletin #cpha-1)**

Minerals & Chemicals Div., CW

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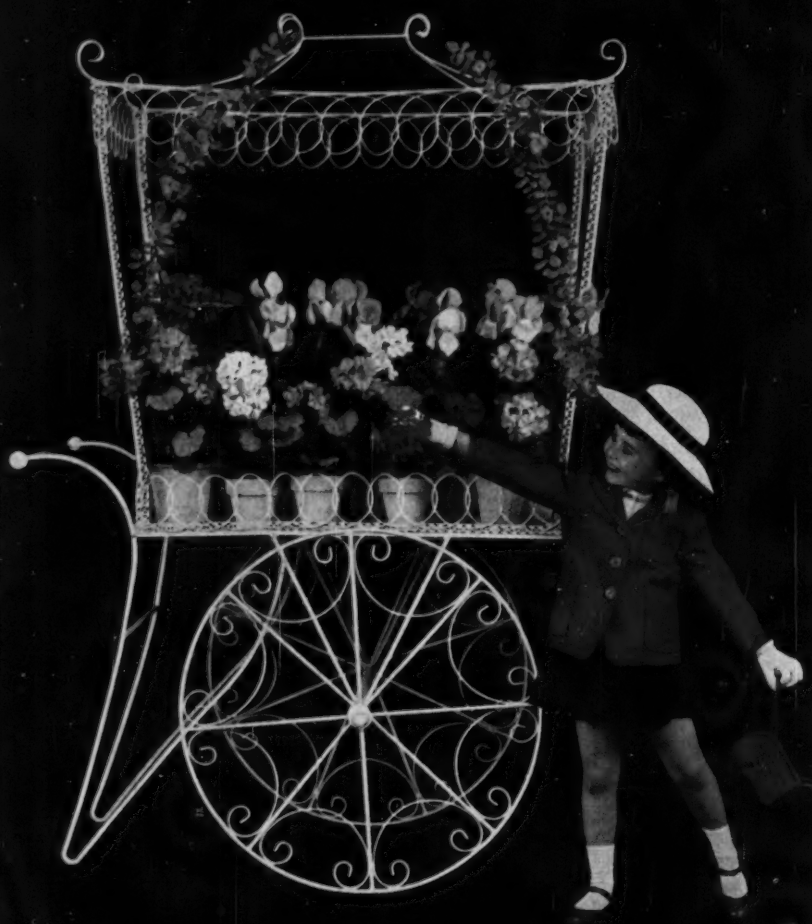

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